

AUTHORIZING APPROPRIATIONS TO THE NATIONAL SCIENCE FOUNDATION

MARCH 30, 1984.—Committed to the Committee of the Whole House on the State of
the Union and ordered to be printed

Mr. FUQUA, from the Committee on Science and Technology,
submitted the following

REPORT

together with

MINORITY AND ADDITIONAL VIEWS

[To accompany H.R. 4974]

[Including cost estimate of the Congressional Budget Office]

The Committee on Science and Technology, to whom was referred the bill (H.R. 4974) to authorize appropriations for the National Science Foundation for fiscal years 1985 and 1986, having considered the same, report favorably thereon with amendments and recommend that the bill as amended do pass.

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The amendments are as follows:

The title of the bill is amended to read: "To authorize appropriations to the National Science Foundation for fiscal year 1985".

Strike all after the enacting clause and insert in lieu thereof the following:

That this Act may be cited as the "National Science Foundation Authorization Act for fiscal year 1985".

Sec. 2. (a) There is authorized to be appropriated to the National Science Foundation for the fiscal year 1985, the sums set forth in the following categories:

- (1) Mathematical and Physical Sciences, \$416,710,000.
- (2) Engineering, \$147,100,000.
- (3) Biological, Behavioral, and Social Sciences, \$258,120,000.
- (4) Astronomical, Atmospheric, Earth, and Ocean Sciences, \$373,480,000.
- (5) Antarctic Research Programs, \$115,080,000.
- (6) Scientific, Technological, and International Affairs, \$52,400,000.
- (7) Program Development and Management, \$70,902,000.
- (8) Science and Engineering Education, \$83,700,000.

(b) In addition to the sums authorized by subsection (a), not more than \$40,000,000 (over and above the \$20,000,000 available for Advanced Scientific Computing in subsection (a)) is authorized to be appropriated for the fiscal year 1985 for Advanced Scientific Computing.

(c) Of the amount authorized under subsection (a)(3), not less than \$73,880,000 shall be available to the Behavioral and Neural Sciences Division and the Social and Economic Sciences Division, and not less than \$8,000,000 shall be available to the Information Science and Technology Division.

Sec. 3. appropriations made under authorizations provided in sections 2 and 5 shall remain available for obligation or obligation and expenditure for periods specified in the Acts making the appropriations.

Sec. 4. From appropriations made under authorizations provided in this Act, not more than \$3,500 may be used for official consultation, representation, or other extraordinary expenses at the discretion of the Director of the National Science Foundation. His determination shall be final and conclusive upon the accounting officers of the Government.

Sec. 5. In addition to the sums authorized by section 2, not more than \$2,800,000 is authorized to be appropriated for the fiscal year 1985 for expenses of the National Science Foundation incurred outside the United States, to be drawn from foreign currencies that the Treasury Department determines to be excess to the normal requirements of the United States.

Sec. 6. If the total amount of appropriations made by any Act for the fiscal year 1985 for program activities included in sections 2 and 5 is less than the total

amount authorized to be appropriated for those activities by sections 2 and 5, the amount available from such appropriations for any particular program activity shall bear the same ratio to the amount authorized to be appropriated for that activity by sections 2 and 5 as the total amount of the appropriations made by such appropriation Act for all included program activities bears to the total amount authorized to be appropriated for those activities by sections 2 and 5 (with the minimum amounts required by section 2(b) being reduced in the same ratio), except to the extent specifically otherwise provided in the text of the Act making the appropriations for the program activities involved.

SEC. 7. (a) Funds may be transferred among the categories listed in section 2(a) so long as the net funds transferred to or from any category do not exceed 10 per centum of the amount authorized for that category in section 2.

(b) In addition, the Director of the Foundation may propose transfers to or from any category exceeding 10 per centum of the amounts authorized for that category in section 2; but an explanation of any such proposed transfer must be transmitted in writing to the Speaker of the House, the President of the Senate, and the appropriate authorizing committees of the House and Senate, and the proposed transfer may be made only when—

(1) thirty calendar days have passed after the transmission of such written explanation, or

(2) the chairman of each of the appropriate authorizing committees of the House and Senate has notified the Director in writing that such committee has no objection to the proposed transfer.

SEC. 8. (a) The last sentence of section 4(e) of the National Science Foundation Act of 1950 is amended by striking out "by registered mail or certified mail mailed to his last known address of record".

(b) The text of section 9 of such Act is amended to read as follows:

"SEC. 9. (a) Each special commission established under section 4(h) shall be appointed by the Board, and shall consist of such members as the Board considers appropriate.

"(b) Special commissions may be established to study and make recommendations to the Foundation on issues relating to research and education in science and engineering."

(c) Section 12 of such Act is amended by striking out subsection (b), and by striking out "(a)" after "Sec. 12."

(d) Section 14 of such Act is amended by striking out subsection (b).

(e) Section 6 of the National Science Foundation Authorization Act, Fiscal Year 1978 (Public Law 95-99), is repealed.

(f) Section 10 of the National Science Foundation Authorization Act, Fiscal Year 1978 (Public Law 95-99), is repealed.

SEC. 9. (a) Section 3(a)(1) of the National Science Foundation Act of 1950 is amended—

(1) by striking out "engineering,"; and

(2) by inserting after "other sciences," the following: "and to initiate and support research fundamental to the engineering process and programs to strengthen engineering research potential and engineering education programs at all levels in the various fields of engineering,".

(b)(1)(A) Section 3(a)(3) of such Act is amended—

(i) by inserting "and engineering" after "scientific"; and

(ii) by inserting "and engineers" after "scientists".

(B) Section 3(a)(4) of such Act is amended by inserting "and engineering" after "sciences".

(C) Section 3(a)(5) of such Act is amended by inserting "and fields of engineering" after "sciences".

(D) Section 3(a)(6) of such Act is amended by striking out "technical" each place it appears and inserting in lieu thereof "engineering".

(E) Section 3(a)(7) of such Act is amended by inserting "and engineering" after "scientific".

(2) Section 3(b) of such Act is amended by inserting "and engineering" after "scientific" each place it appears.

(3) Section 3(c) of such Act is amended—

(A) by inserting "and engineering" after "scientific" in the first sentence; and

(B) by inserting "and engineering research" after "applied scientific research" in the second sentence.

(4) Section 3(d) of such Act is amended by striking out "basic research and education in the sciences" and inserting in lieu thereof "research and education in science and engineering".

- (5) Section 3(e) of such Act is amended by inserting "and engineering" after "sciences".
- (6) Section 4(c) of such Act is amended—
- (A) by inserting "and engineering" after "scientific" in clause (3) of the first sentence;
 - (B) by inserting "and engineers" after "scientists" in the second sentence; and
 - (C) by inserting "the National Academy of Engineering," after "National Academy of Sciences," and ", engineering," after "scientific", in the third sentence.
- (7) The first sentence of section 10 of such Act is amended by striking out "scientific study or scientific work in the mathematical, physical, medical, biological, engineering, social, and other sciences" and inserting in lieu thereof "study and research in the sciences or in engineering".
- (8) Section 11 of such Act is amended—
- (A) by inserting "or engineering" after "scientific" each place it appears in subsections (c) and (i); and
 - (B) by inserting ", engineering", after "scientific" where it first appears in subsection (g).
- (9) Section 12 of such Act is amended by inserting "or engineering" after "scientific".
- (10) Section 13 of such Act is amended—
- (A) by inserting "or engineering" after "scientific" each place it appears; and
 - (B) by inserting "or engineers" after "scientists" in subsection (a).
- (11) Section 14 of such Act is amended—
- (A) by inserting "or engineering" after "scientific" each place it appears in subsection (f); and
 - (B) by striking out "technical" in subsection (g) and inserting in lieu thereof "engineering".
- (12) Section 15(b) of such Act is amended—
- (A) by striking out "technical" in paragraph (1) and inserting in lieu thereof "engineering"; and
 - (B) by inserting "or engineering" after "scientific" in paragraph (2).
- (13) Section 2(b) of Public Law 94-86 is amended by inserting "or engineering" after "science" each place it appears.
- (c) The amendments made by this section shall be effective on the date of enactment of this Act.

I. SUMMARY

BUDGET ACTIONS

Budget total

The President's budget included a request for \$1,501,792,000 for the National Science Foundation in fiscal year 1985.

H.R. 4974 includes new obligatory authority totalling \$1,560,292,000. This amount is a \$58,500,000 increase over the Administration's request.

Increases

(1) Biological, Behavioral, and Social Sciences is increased by \$5.0 million, to provide additional funding for the behavioral, social, and information sciences.

(2) Scientific, Technological and International Affairs is increased by \$5.5 million. This amount is to reinstate the Experimental Program to Stimulate Competitive Research (EPSCoR) at a level of \$3.0 million and to increase the Research Improvement in Minority Institutions (RIMI) program by \$2.5 million.

(3) Science and Engineering Education is increased by \$8.0 million, for Graduate Research Fellowships.

(4) The amount available for Advanced Scientific Computing is increased by \$40.0 million.

Other

The bill requires that of the amount authorized for Biological, Behavioral and Social Sciences, not less than \$73.9 million shall be available to the Behavioral and Neural Sciences Division and the Social and Economic Sciences Division, and that not less than \$8.0 million shall be available to the Information Science and Technology Division.

OTHER ACTIONS

(A) The bill amends the National Science Foundation Act of 1950 as follows:

(1) To permit the Foundation to initiate and support fundamental engineering research and engineering education programs.

(2) To provide greater flexibility in establishing special commissions by the National Science Board and in providing membership for such commissions.

(3) To remove provisions banning National Science Foundation employees from owning patents on inventions resulting from National Science Foundation work. The Foundation performs no in-house research, and the provision has never been needed.

(4) To remove an unnecessary provision that senior Foundation officials must be full-time employees.

(5) To remove the requirement, considered obsolete, that members of the National Science Board be notified of meetings by registered or certified mail.

(B) Two sections are deleted from Public Law 95-99, the National Science Foundation Authorization Act of 1978, to remove unnecessary codification, as follows:

(1) Section 6, regarding National Resource Centers, now covered by superseding law.

(2) Section 10, regarding conflict of interest, superseded by the Ethics in Government Act.

C. Additional concerns and views of the Committee are reflected in the Committee Views on Programs and Policies section of this report.

PURPOSE OF THE BILL

The purpose of the bill is to authorize appropriations to the National Science Foundation for fiscal year 1985 in the amount of \$1,557,492,000 out of money in the Treasury not otherwise appropriated and \$2,800,000 for fiscal year 1985 in foreign currency which the Treasury Department determines to be excess to normal requirements of the United States as follows:

Budget activities

	<i>Authorization fiscal year 1985.</i>
Research and related activities:	
Mathematical and physical sciences	\$416,710,000
Engineering	147,190,000
Biological, behavioral, and social sciences	258,120,000
Astronomical, atmospheric, earth and ocean sciences.....	373,480,000
U.S. Antarctic program.....	115,080,000
Scientific, technological, and international affairs.....	52,400,000
Program development and management.....	70,902,000
Advanced scientific computing	40,000,000
Science and engineering education	83,700,000
Special foreign currency	2,800,000
Total.....	1,560,292,000

NATIONAL SCIENCE FOUNDATION BUDGET COMPARISONS
ACTIONS BY THE COMMITTEE ON SCIENCE AND TECHNOLOGY
[Authorizations in millions of dollars]

Activities	Current Fiscal Year 1984	Administration Request Fiscal Year 1985	Committee Recommendation (H.R. 4974)	Changes from Administration Proposal
RESEARCH & RELATED ACTIVITIES				
Mathematical & Physical Sciences	358.8	416.7	416.7	0
Engineering	120.7	147.1	147.1	0
Biological, Behavioral & Social Sciences	224.7	253.1	258.1	+5.0
Astronomical, Atmospheric, Earth & Ocean Sciences	330.0	373.5	373.5	0
U.S. Antarctic Program	102.5	115.1	115.1	0
Scientific, Technological & International Affairs	40.8	46.9	52.4	+5.5
Program Development and Management	66.6	70.9	70.9	0
Advanced Scientific Computing	(6.0)*	(20.0)*	40.0	+40.0
SUBTOTAL, RESEARCH & RELATED ACTIVITIES	1244.1	1423.3	1473.6	+50.5
SCIENCE & ENGINEERING EDUCATION	88.9**	75.7	83.7	+ 8.0
SPECIAL FOREIGN CURRENCY	2.9	2.8	2.8	0
TOTAL	\$1335.9	\$1501.8	\$1560.3	+58.5

* Numbers enclosed in parentheses are non-adds for comparison purposes only.

** Includes \$13.9 million carry-over from Fiscal Year 1983.

II. COMMITTEE VIEWS

1. NSF ROLE IN FUNDAMENTAL ENGINEERING RESEARCH

Committee view

The Committee believes that the amendment to the NSF Organic Act (Section 8 of the Authorization) will bring science and engineering closer together in the Federal structure. It is the Committee's intent to emphasize and strengthen the Foundation's role in supporting academic research and talent in both science and engineering, rather than creating a divisive partition. The Committee expects that the Foundation's ability to support both basic science and fundamental engineering will be strengthened, without having to support one at the expense of the other. Both are necessary ingredients for technological growth, and warrant careful attention from the NSF.

Discussion

The Committee approves of the new initiatives in engineering within the Foundation. However, it believes that the Foundation's basic mission statement should reflect the current status of engineering.

After careful consideration in Subcommittee and Full Committee hearings, the Committee adopted an amendment to the NSF Organic Act (Public Law 81-507, as amended) in order to reflect an increased emphasis on fundamental engineering in the Foundation. The amendment adds a new function to NSF's mission to authorize the initiation of fundamental engineering research and education, parallel to current NSF functions relating to basic science research and education. The amendment also inserts references to engineering and various fields of engineering throughout the Act to parallel references to science.

The amendment agreed to by the Committee represents a compromise in that it does not call for changes in the name of the Foundation, nor in the name or number of members of the National Science Board. An earlier version called for such changes. The amendment agreed to by the Committee incorporates modifications suggested by the Director of the Foundation and the Chairman of the National Science Board. The Committee understands that the amendment, as adopted, has the support of a variety of prominent professional and academic organizations.

2. ADVANCED SCIENTIFIC COMPUTING

Committee view

The Committee directs that the FY 1985 funding level for the Advanced Scientific Computing initiative be increased to a total of \$60.0 million. Further, the Committee requests that this initiative be carried as a line item in the NSF budget, as well as identifying the cross-directorate approach to the development of the program.

The increase represents an addition of \$40.0 million to the \$20.0 million requested by the Administration. The Committee believes that strong initial support, as well as adequate continued funding, is essential for the development, implementation, and continuation

of a program to provide the immediate and long-range needs for advanced computing services to the U.S. science and engineering research community. To insure that an effective program is developed, mechanisms should be established to facilitate the exchange and use of the latest computer developments among physicists, chemists, biologists, and many other researchers as well as computer scientists and electrical engineers.

Discussion

The Committee is pleased with NSF's initiation of a large-scale computing program. The use of supercomputers (by definition, the fastest and most powerful computers available at any given time), for the advancement of many areas of science and engineering has become essential. According to a report recently published by the Working Group on Computers for Research, "A National Computing Environment for Academic Research," (the Bardon/Curtis report), science and engineering researchers in the U.S. have immediate needs for two large-scale machines. This report projects that as many as ten of these computers would be necessary to meet foreseeable science and engineering applications. At present, many U.S. researchers are obliged to carry out their advanced scientific computations at foreign supercomputer facilities.

In view of this need, the Committee expects the NSF to establish a strong, viable advanced scientific computing effort during FY 1985, including the development of an organizational structure which will support increased services for university, college and industry researchers. The Committee anticipates that the advanced scientific computing effort will be guided by the NSF Advisory Committee for Advanced Scientific Computing Resources. The Committee again emphasizes the importance of an interagency policy committee to plan, implement, and operate a long-term national program on advanced scientific computing, and expects the NSF to accept a leadership role in coordinating their program with other Federal agencies.

The development of an effective large-scale computing program involves not only developing supercomputer centers, but also the support of a wide-reaching computer network, with capabilities for supercomputer access, local network access facilities, software development, and researcher access to new prototype machines. Of particular interest to the Committee, is the initiation of a distributed supercomputing effort, designed to encourage industry in the development of higher-capability, lower-cost machines by creating market incentives for such machines. U.S. companies face increased competition from Japan and other nations. Giving U.S. industry a clear indication of potential scientific needs for supercomputers, can not only help industry meet these needs, but also strengthen their world economic position.

The Committee believes that it is imperative for all components of the advanced scientific computing program to be implemented as soon as possible. If the network is not built, centers cannot be accessed, and vice versa. If the local university computing infrastructure is not enhanced, university researchers will not be able to access the network. Also, substantial work in software and algorithm development must begin to take full advantage of the ma-

chines, yet this requires access to large-scale computing facilities. According to the NSF Advisory Committee for Advanced Scientific Computing Resources, charged with advising on the implementation of the initiative, "computational and information science should eventually have about equal priority and funding levels with experimental or theoretical science." This NSF Advisory Committee agrees with the Bardon/Curtis report's recommendation that for the immediate future, the initiative requires a \$180.0 million budget investment.

All components of a viable advanced scientific computing program are highly interdependent. Therefore, the Committee does to view a \$20.0 million initiative adequate to simultaneously stimulate the required components, address immediate needs, and develop the infrastructure to prepare to meet long-term needs of the science and engineering community. The Committee believes that a \$60.0 million initial effort, although substantially below the level suggested by the Bardon/Curtis report or the NSF Advisory Committee, is the minimum amount necessary to begin a viable program. The Committee expects the Advisory Committee for Advanced Scientific Computing Resources to set the program's initial priorities such that the most important parts of the initiative are implemented in fiscal year 1985 and concrete proposals for the remainder are in space in place allowing for substantial funding increases in the future.

The Committee also commends the National Center for Atmospheric Research (NCAR) for the quality of the research it supports and the leadership role it has played in advanced scientific computing for atmospheric and oceanographic research. The Committee does not discredit the contribution a third large-scale scientific computer at NCAR, such as the proposed Advanced Vector Computer to be funded in fiscal year 1985 and fiscal year 1986, will make to the advancement of the atmospheric and oceanographic sciences. However, the Committee believes that budgetary planning and allocations for advanced scientific computing capabilities at NCAR and other NSF facilities should become an integral part of the overall NSF plan for accessing, allocating, and managing advanced scientific computing resources for the total scientific community served by the NSF. When additional computing resources become available to NCAR, consideration should be given to allocating a percentage of those resources to other priorities as deemed appropriate by the NSF Advisory Committee for Advanced Scientific Computing Resources.

3. SCIENCE AND ENGINEERING EDUCATION

Committee view

The Committee continues to feel strongly that the Foundation assume and maintain a strong, active role in science and engineering education. Even though the Foundation's activities are but a small part of the total Federal involvement in education, the Committee feels that the Foundation can have a dramatic impact on the direction and quality of education in these areas. Expression of the Committee's attitude on this issue can be clearly seen in the passage of H.R. 1310, legislation dealing with science, mathematics,

and foreign language education, as well as House Reports 97-34 and 97-485 as they address precollege education and the NSF.

In recent testimony before the Committee it became clear that precollege teachers were virtually unaware of the Foundation's renewed activities, particularly in the area of precollege teacher development. In order to remedy this situation the Committee directs the Foundation to aggressively publicize its programs for elementary and secondary teachers so that teachers throughout the nation know of their existence and are informed of how to participate. Concurrent with this outreach, the Committee expects emphasis to be placed on precollege materials development and research.

The Committee expects the Foundation to prepare for the development and implementation of community college and undergraduate programs in fiscal year 1986 as part of the activities in the Science and Engineering Education (SEE) Directorate. The Committee's attitude and intentions with regard to community college and undergraduate programs was clearly stated as part of H.R. 1310. At the same time, the Committee strongly feels that funds for programs in the community college and undergraduate areas should not reduce the level of funds for precollege activities below the fiscal year 1985 levels.

The Committee directs that the fiscal year 1985 funding level for the Graduate Research Fellowships be increased by \$8.0 million for a total of \$29.0 million. The Committee intends that the additional funds be used to increase the number of graduate fellowships as well as the stipend and the cost-of-education allowance. The Committee expects the Graduate Research Fellowship program to expand in future years with particular emphasis on increasing the yearly stipends to a level comparable with similar programs in the Department of Defense (DOD).

The Committee wishes to make special note of the issue of carryover funds. Almost fourteen million dollars was carried over from fiscal year 1983 to fiscal year 1984 and, according to recent testimony, possibly an even greater amount will be carried over from fiscal year 1984 to fiscal year 1985. The Committee fully realizes that time is needed to properly organize and staff the SEE's activities, since the previous Directorate was abolished in fiscal year 1983. However, the Committee reminds the Foundation that the funding level authorized for a specific year was intended as the level of expenditure for that fiscal year. The Committee expects that the practice of carrying over large sums from one fiscal year to another will not continue beyond fiscal year 1985. Given the vital importance of science and engineering education, the Committee anticipates the expenditure of funds in this directorate to be carried out with dispatch while aiming for the quality that typifies the rest of the Foundation's work.

Discussion

The Committee Reports accompanying the NSF Authorizations for fiscal years 1982 and 1983 (H. Rept. 97-34 and 97-485) both strongly emphasize precollege education as a priority for the SEE activities. Revitalizing precollege math and science education through teacher training and retraining as well as curriculum improvement were highlighted by the Committee. Further, enhance-

ment of public understanding of science and technology through various types of media is encouraged as a means of supplementing precollege education and reaching as many citizens as possible.

The precollege programs of H.R. 1310 to be administered by the NSF include summer institutes for current precollege mathematics and science teachers and those seeking recertification; education; research; development of instructional materials; and the precollege science and mathematics training (cost sharing component) of the National Science and Engineering Fund. In general, the Committee points to the substance and philosophy reflected in H.R. 1310 as the goals the Committee wishes to attain in this area.

The Committee also wishes to reiterate the need for vigorous activity in programs relating to predominantly undergraduate institutions, particularly as described in H. Rept. 98-6. Included in this area is the postsecondary mathematics, science, and critical foreign language improvement program described in H.R. 1310. This program was designed to provide for competitive grants to institutions of higher education to improve mathematics, science, and critical foreign language curricula and programs for faculty development. In addition, the program skills and subject content for students who are planning careers as precollege mathematics, science or foreign language teachers. Also, Title II of H.R. 1310 emphasized the need for a four-year college faculty and instructor development program to recruit and retain faculty, especially those in mathematics and science.

The Committee concurs with recommendations that the Foundation should increase utilization of telecommunications to meet many of its education objectives. Television programs such as "3-2-1 Contact" have achieved remarkable results in science education in the home and in the classroom. Other areas such as junior high school mathematics and in-service teacher education could benefit from this approach.

The Committee expects the Foundation to support such efforts to utilize television for science and mathematics education. Further, the Committee feels that support for innovative technologies such as computers and interactive video discs is clearly appropriate and should be pursued. Other Federal agencies have made use of interactive video discs for educational purposes with great success, particularly in the area of retraining. The Foundation should review such Federal efforts and make the necessary adoptions for precollege program development.

4. BEHAVIORAL, SOCIAL AND INFORMATION SCIENCES

Committee view

The Committee directs that funds for programs in the Behavioral and Neural Sciences and Social and Economic Sciences Divisions of the Biological, Behavioral and Social Sciences (BBS) Directorate be increased by a total of \$3.6 million. In addition, it is directed that the Information Science and Technology Division's funding be increased by \$1.4 million. The Committee has authorized an increase of \$5.0 million for BBS for these increases, bringing the total to \$258.1 million from the Foundation request of \$253.1 million.

The Committee intends that the \$3.6 million added for the Behavioral and Neural Sciences and the Social and Economic Sciences Divisions be directed specifically to the social and behavioral sciences. Funding for these programs in BBS must not be allowed to erode further. The Committee feels strongly that they should be returned to their fiscal year 1980 level; this increase will bring them nearer to that level.

Discussion

The Committee is concerned that again this year the behavioral, social and information sciences have received a disproportionately low share of the increase requested for BBS in fiscal year 1985.

In the Behavioral and Neural Sciences Division, the Neuroscience program element enjoys a 12.2 percent increase, while Cognitive Science increased only 5.3 percent and Anthropology only 6.3 percent. In the Division of Social and Economic Sciences, the 13.8 percent increase will go primarily for the support of large scale data bases, leaving little for individual investigator projects, or basic social research. As one witness at the Subcommittee hearings pointed out, "a strong research system requires not only the development and maintenance of good data bases, but also support of established scholars and training for their successors."

There is concern that a consistent decline in support for the social and behavioral sciences, which began with fiscal year 1981, can only result in a serious loss of young scientists trained in those fields. This comes at a time when their importance increasingly is being recognized. A recent National Academy of Sciences (NAS)/National Research Council (NRC) report, "Behavioral and Social Science Research: A National Resource," looks at development in basic research in the social and behavioral sciences and endorses the scientific advances of recent years. The Academy also is undertaking a survey of research needs in the social and economic sciences which will be helpful in establishing future priorities. In the meantime, the NSF must increase its support for these areas, which have amply demonstrated their value in helping to solve human factor problems of productivity, and other aspects of improving the economy.

The Division of Information Science and Technology is the primary Federal supporter of fundamental research in information science and technology. Although this program has realized only limited growth since it was established as a new program about five years ago, the program has attracted high quality multi-disciplinary research proposals from virtually all fields of science.

Information science and technology continues to play an important role in maintaining and enhancing the U.S. position in economic leadership and preserving national competitiveness in world markets. The Committee reiterates its views of the past several years that this emerging interdisciplinary field deserves an increased growth in funding to nurture the development of research in information science and technology, and to realize the potential contribution such research can make to other areas of science and engineering.

The Committee directs the NSF to give higher priority and support to the Division of Information Science and Technology. The

begin incremental increases in the funding level of the Division, the Committee has increased funds authorized for BBS and has directed the NSF in the authorizing legislation to make not less than \$9.0 million available to the Information Science and Technology Division.

5. EXPERIMENTAL PROGRAM TO STIMULATE COMPETITIVE RESEARCH (EPSCoR)

Committee view

The Committee directs the National Science Foundation (NSF) to reinstate EPSCoR, at a level of \$3.0 million for fiscal year 1985, and has increased funds authorized for the Scientific, Technological and International Affairs (STIA) Directorate for this purpose.

The Committee has given strong support to the NSF for EPSCoR. This program was established as a five-year effort to increase the capability of scientists and engineers in states that have been relatively less successful in competing for Federal R&D funds, thereby encouraging a wider distribution of scientific talent, and of Federal funds. Under EPSCoR, the Foundation awarded \$2.5 to \$3.0 million each year from fiscal year 1981 through fiscal year 1984 to universities in five states that were among the lowest in total Federal research funding. The awards were made to help support state-wide research improvement plans; the five states chosen were Arkansas, Maine, Montana, South Carolina and West Virginia. Last year the Committee urged the NSF to continue the EPSCoR program, which was scheduled to end with fiscal year 1984, on a permanent basis. However, it was not included in the Foundation's fiscal year 1985 budget request. The Committee feels strongly that the relatively small investment in resources targeted for the EPSCoR program is more than balanced by the success it has had in helping to build a broader base for scientific achievement in this country. This success could be extended to other states in the lower funded category by using criteria for selection and review similar to that of previous years.

Discussion

Although their primary criterion for selection of awards is the scientific merit of the project, the NSF often makes special efforts to focus on particular needs in the sciences. One of these needs has been wider development of scientific talent and centers of excellence across the country.

As far back as the mid-sixties, there was an apparent need to maintain a technological leadership position and to improve the overall quality of university based science and engineering. Thus, the Foundation established the Science Development Programs. These programs, designed to increase the number of high quality researchers and strong institutions dedicated to quality research and education, were provided nearly \$250.0 million during the period from 1965 through 1973. The focus was on elevating institutions, below the top 20, to "equivalency" with the major centers of excellence over a five to seven year period.

EPSCoR, established in 1978 by the NSF pursuant to a recommendation from an NSF Task Force on Geographic Distribution of

Awards, like the Science Development Programs, worked toward the objective that every geographic region of the United States should have access to a first-rate research institution.

Testimony and other information received by the Committee, including an NSF interim report, point to EPSCoR's success with a relatively small investment of funds. Writing in the February 17, 1984 *Science*, Gary A. Strobel, director of the EPSCoR program at Montana State University, highlights a number of achievements made at his university under the program. He states that well over 50 percent of the original EPSCoR investigators have acquired extramural research funds from Federal, state, and private organizations and agencies, in amounts nearly double those originally received from the NSF, and that after NSF funding has ceased, the program will continue with state funding.

EPSCoR not only enables less-than-top funded institutions to compete for Federal research dollars, but enhances our total research base. Thus, this important program, which also improves undergraduate and graduate education in science in these locations, warrants continuation in other states.

6. WOMEN, MINORITIES AND HANDICAPPED

Committee view

The Committee continues to support the Science and Technology Equal Opportunities Act (Public Law 96-516) and specifically, the declaration of the Congress that, "The highest quality science over the long-term requires substantial support, from currently available research and educational funds, for increased participation in science and technology by women and minorities." For this goal to be realized, the Committee agrees with the Foundation that all of the Directorates, at every level must be concerned with increasing the participation of disadvantaged groups in their programs. However, to assure that responsibility is taken by all programs, the Committee views the central focus of strong targeted programs in STIA as necessary.

With regard to the strength of these programs, the Committee considers that the success of the minority and women programs is not reflected by continuing current level funding in fiscal year 1985. Also, although the Committee commends the initiation of the Research Opportunities for Women (ROW) program, intended to assist women scientists in beginning research after a career interruption, it is concerned as to whether a viable program can be started with \$0.5 million. A similar program, the National Research Opportunities Grants, was established in 1981 at a level of \$5.0 million. However, the latter program never became functional. The Committee expects ROW to be implemented in fiscal year 1985 and, if successful, enhanced in future years.

The Committee also hopes that the merger of Science and Technology to Aid the Handicapped with Bioengineering will continue to support a viable program of research, leading to the development of technical means of alleviating barriers to people with otherwise debilitating handicaps. The Committee supports the \$0.6 million increase for this program and encourages continued support and enhancement of research in this area.

The Committee directs that the authorization for the Research Improvement in Minority Institutions (RIMI) program be increased from \$2.5 million to \$5.0 million. The Committee further directs that the increased authorization be used to make grants available to institutions of higher education which educate substantial numbers of minority students including Blacks, Hispanics, American Indians, U.S. born Asian Americans and members of other minority groups. The Committee notes that testimony received during the fiscal year 1984 NSF Authorization hearings indicated that the RIMI program was not stimulating the entry of certain minority group members into the sciences. The intent of the Committee in increasing the RIMI authorization is to extend the program to include not only the historically Black colleges and universities but also other institutions of higher education which serve substantial numbers of minorities.

7. INSTRUMENTATION AND FACILITIES

Committee view

The Committee supports the overall trend of increased support for instrumentation. However, more can be done, particularly in the special equipment programs. Concurrently, the Committee feels that any attempt to remedy this problem by shifting research funds into a special equipment line item would be inappropriate. The Committee expects the NSF to proceed in the following manner; (1) monitor NSF research grants to ensure that funds made available for instrumentation are used for that purpose; (2) continue to develop "indicators" on the status of research instrumentation as requested in the Committee Report 97-485, to discern the trends in instrumentation and facility funding; (3) create additional categories of research instrumentation and equipment support in other Directorates similar to the example of the Mathematical and Physical Science (MPS) Directorate; and (4) enhance funding in special equipment programs in the future.

In pursuit of these goals the Committee directs the Foundation to provide an explanation of its proposed actions for fiscal years 1985 and 1986. Further, the Committee asks that such information be organized in a consistent and clear fashion to show the direction and scope of activities over a period of years.

It must be noted that it will require sustained effort over several years to revitalize instrumentation in university laboratories. The Committee realizes that although the NSF does not bear sole responsibility for support of instrumentation needs in universities and colleges, it should aggressively encourage and lead other Federal agencies, in conjunction with state and local governments and the private sector, to support the renewal of university research and instructional facilities.

Discussion

Recent testimony before the Committee from the Association of American Universities (AAU) and Dr. William Fowler, Nobel Laureate, noted the critical shortage of current instrumentation in university laboratories and classrooms. The serious state of university instrumentation was highlighted and steps were proposed to

remedy the problem. The National Society of Professional Engineers (NSPE) estimate that a \$1.2 billion investment would be needed to restore engineering instrumentation laboratories to their 1971 condition and an additional \$1.0 billion would be needed to compensate for the additional demand since then.

To address identified needs, the NSF has begun to fund research instrumentation both within research grants as well as within special equipment programs. For example, in MPS there are four categories of research instrumentation and equipment support: (1) support for instrumentation in research projects; (2) special equipment programs; (3) university research laboratories; and (4) national user facilities. The total funding for all of these is \$96.0 million (or 23.3 percent) of the proposed \$416.7 million fiscal year 1985 MPS budget. In the overall fiscal year 1985 budget request, \$122.0 million of the \$237.0 million proposed for facilities equipment and instrumentation, will support research instrumentation for individual projects and the remainder will support instrumentation and facilities at multi-user centers.

8. CENTERS FOR CROSS-DISCIPLINARY RESEARCH IN ENGINEERING

Committee view

In pursuit of the dual goals of improving engineering education and boosting industrial competitiveness, the establishment of the Centers for Cross-Disciplinary Research in Engineering is a strong and necessary step. The Committee feels that engineering education and research are key elements in meeting our nation's technological challenge. Therefore, the Committee expects the Centers will offer teachers, researchers, and students the truly multi-disciplinary experiences necessary to advance the field of engineering in a constantly changing technological environment. Further, the Committee expects the Centers to offer opportunities for closer interaction between universities and industry as well as provide undergraduate and graduate students with "hands on" engineering education. Such strong linkage between interdisciplinary research and education. Such strong linkage between interdisciplinary research and education can have a positive impact on new and developing areas including computer integrated manufacturing systems, voice and data communication systems, and biotechnology.

Of particular importance to the Committee is the treatment of materials engineering activities. The industrial processing of advanced materials such as ceramics, highly alloyed steel, superplastic materials, and organic composites calls for close integration of such fields as chemical, mechanical, and electrical systems engineering. The Committee, therefore, feels that materials engineering is a prime candidate for development in the Centers. The Committee also urges the Foundation to carefully integrate the Centers' program activities with regard to materials engineering into ongoing industry/university programs conducted within STIA.

In recognition of the need for the number of Centers to grow in the future so as to make this program effective, the Committee points out that the request for \$10.0 million for 5 Centers is a start along the road to eventually supporting as many as 25 Centers. At the same time, the Committee's enthusiasm is tempered by its

desire for the attainment of high-quality research and education at each Center and emphasis on excellence during this formative stage of development.

The Foundation is to be commended for requesting the National Academy of Engineering (NAE) to study the various aspects of a cross-disciplinary research center concept including steps for organizing, funding, and operating the Centers in the future. The Committee recommends that the Foundation continue to consult with the NAE, especially on the question of developing criteria for the review of proposals submitted under this new program.

The Committee recognizes that the special nature of this cross-disciplinary experimental program may present problems in conforming to the traditional peer review method. Therefore, the Committee strongly urges the Foundation to adapt its review and evaluation process to take into account the broad scope and variety of proposals offered. NAE's suggestion that the proposal review panel be composed of individuals with knowledge of engineering practice, a broad view of engineering education, and competence in engineering research is an appropriate step in addressing the unique nature of this program.

9. PRESIDENTIAL YOUNG INVESTIGATOR AWARDS (PYI)

Committee view

The Committee supports the Foundation in its new PYI program announced in fiscal year 1984, and is pleased to note that the first 200 awards have been made. This matching fund program, intended to help universities attract and retain outstanding young PhDs, will support five years of research by faculty near the beginning of their academic careers. It is expected that 200 new investigators will be named each year, resulting after five years in a projected level of 1,000 active awards.

When the PYI Awards program was announced last year, the Committee expressed concern that research in behavioral and social sciences was omitted from the fields to be supported under the program. While it may be true that the majority of faculty shortages occur in fields other than the behavioral and social sciences, the Committee feels that those disciplines should not be excluded. It urges that the NSF, in making future PYI awards, consider all fields of science.

10. POLICY RESEARCH AND ANALYSIS

Committee view

The NSF Division of Policy Research and Analysis (PRA) is charged with conducting, (1) reviews, evaluations, and development of assessment and analysis techniques in science and technology policy, and (2) science and technology policy analyses for the National Science Board, as well as for the Director of the NSF, the Executive Office of the President (including the Office of Science and Technology Policy and the Office of Management and budget), and other Federal agencies.

In the Committee's view, both of these activities are important. Many policy analyses involving science and technology issues have

been disappointing, for reasons ranging from unclear distinctions between issues of scientific fact and social value, to poor analytical techniques, and inadequate definition of scientific uncertainty. These limitations suggest that research into the basic capabilities of policy analysis is essential to improve the foundation on which science and technology policy is conducted. However, the Federal agencies and Executive Office should be able to rely upon high quality, comprehensive policy analyses to develop sound science and technology programs in both the short and long term.

The Committee considers the fiscal year 1985 funding decrease for the Subactivity on Policy Sciences as a step away from supporting a fundamental long-term improvement of the policy field, and a step towards considering PRA as a Federal policy analysis "shop". Because of the often political nature of Federal and executive policy analyses, too great an emphasis on being a "shop" could jeopardize the Foundation's reputation for objective research. The Committee does not expect this to be a pattern for PRA resource allocation in future budgets.

11. COMPUTER SCIENCE, INFORMATION SCIENCE AND ENGINEERING RESEARCH

Committee view

The rapid development and convergence of information and communications technologies has enhanced the opportunity and need to coordinate and integrate research and development in computer science, information science, and engineering. The Committee congratulates the NSF and the Department of Defense for convening the January 1983 workshop on computer and information science and engineering to review the research objectives and priorities in these fields.

The Committee notes that the NSF research support responsibilities in these emerging disciplines are distributed among three Directorates. Research in these areas is extremely important to maintaining economic growth, productivity, and U.S. competitiveness in the international marketplace. The Committee wishes to insure that maximum benefits are derived from the research programs in computer and information science and engineering through effective priority setting, funding, coordination and organizational arrangements. Thus, the Committee directs the NSF, in conjunction with the National Science Board (NSB), to review possible mechanisms, including those currently in place, and recommend appropriate action for effective support of these interrelated research programs and for dissemination of research outcomes and findings.

12. EVALUATED ENGINEERING DATA

Committee view

As computer methods are increasingly integrated in everyday engineering practices, the need for better flow of reliable technical data becomes acute. The NSF, in its expanded engineering role, should assume a leadership position in public engineering data resource development. Other nations are moving ahead with data and information systems, parallel with their technology (e.g. Japan,

France, Germany). They appear to understand that the health of their national economies is well-served by the small investment data systems require relative to the total research and development effort.

No coordinated effort in materials and engineering data exists in the U.S. today. Our piecemeal approach has resulted in only a few, mostly mission-oriented, data projects. The ability of non-mission oriented activities to provide public engineering data resources has all but disappeared. Considering the broad NSF charge to support the infrastructure of science and non-mission oriented technology, the Foundation should develop and contribute to a materials and engineering data evaluation system in coordination with efforts of other national agencies such as the National Bureau of Standards (NBS).

Discussion

The NSF peer review system virtually eliminates any opportunities for the support of physical and chemical data evaluation proposals. The established system of comparing new and exciting research proposals directly with this unglamorous labor of science infrastructure support will also be invalid for engineering data. Needed data compilation and evaluation will require a unique approach by the NSF.

Current practices waste good research results. The costs are in terms of reduced productivity and innovation and in lost opportunities. The NSF's thrust to stimulate a better high-technology environment should include improvement of the flow of evaluated engineering data.

13. MANAGEMENT INFORMATION SYSTEM (MIS)

Committee view

The Committee has a continuing concern over the effect of the NSF's management on funding for research instrumentation, international, state and local science and technology, the monitoring of the participation of women, minorities and handicapped in science and technology, as well as other cross-directorate issues. To assess this effect, reliable data must be available from the NSF on research funding patterns, characteristics, locations and specialties of principal investigators, and the funding break-down of grants into their component parts.

An April 8, 1980 Government Accounting Office (GAO) report entitled, "The National Science Foundation's Management Information System: A Status Report," suggested many improvements were needed at that time in the NSF's MIS. These improvements included: (1) upgrading system reliability, particularly with regard to incomplete or inaccurate data; (2) establishment and implementation of a long-range system plan; and (3) assessment of user needs in terms of data, system response time, and training.

The Committee is also concerned that the Foundation, four years after the GAO made its recommendations, is still in the process of building a new MIS. Therefore, the Committee directs the NSF to submit an update on the implementation of GAO's recommendations. In addition, because of the Committee's concerns, we request

that the Foundation address MIS capabilities for readily and reliably supplying information such as:

- The number of female and minority peer reviewers and principal investigators (PIs);

- Average grant size for female, minority, and handicapped PIs in the aggregate and by discipline;

- Number of international awards by country and discipline;

- Percentage of international grants awarded through bi-lateral agreements and through the regular programs;

- Percentage of international award funds going to research, travel and personnel;

- Geographic distribution of research funding;

- Percentage of grant funds going to instrumentation, personnel, overhead and research by individual PIs, discipline, academic institution, and in the aggregate.

14. REPORTING OF CURRENT RESEARCH PROJECTS

Committee view

The Committee has long recognized the importance of the exchange of scientific and technical information for: (1) effective research planning and resource allocation; (2) the application of new knowledge; (3) the economic productivity of the private sector as well as the Federal government; and (4) the enhancement of the quality of life. The National Technical Information Service (NTIS) was established to promote technological, scientific, economic, business and engineering information to industry, state and local governments and related organizations. In 1981 NTIS absorbed the Smithsonian Science Information Exchange function of disseminating information on research in progress by Federal agencies.

Discussion

The Committee is concerned that the NSF has elected not to contribute status reports of the NSF supported research in progress to NTIS. Since the NSF's research obligations account for approximately 16 percent of the total Federal support of basic research, the NSF's failure to participate in the NTIS program considerably reduces the value of the NTIS program. In addition, the absence of the NSF data reduces the benefit of this information to the Federal government, academia, and the public and private sectors, possibility resulting in unnecessary duplication of research efforts, limited technology transfer, and reduced opportunities for information exchange among scientists and research managers. Therefore, the Committee directs the NSF to submit to the Congress by November 1984 a report which: (1) describes the NSF's internal system for reporting the objectives and status of research in progress, and (2) assesses the costs and benefits of the NSF's participation in the NTIS program to the NSF, NTIS and major NTIS subscribers. The report shall propose an implementation plan, including the resources and milestones necessary for the NSF to participate in the NTIS program beginning in fiscal year 1985.

15. AFFIRMATIVE ACTION

Committee view

The Committee has always supported the NSF in its commitment to affirmative action in science. The Committee has recommended and supported programs which have aided the entry of women, minorities and the handicapped into the sciences. But one of the most tangible ways by which the Federal government can demonstrate its commitment to equity is to see that it is achieved within the agencies of the Federal government itself. Women, minorities, and the handicapped do not hold positions of authority within the NSF in a proportion which reflects the distribution that the Federal government desires.

Recently there have been signals that the NSF may not be expending sufficient effort to achieve equity within its own personnel ranks. For example, a recent reduction in force which included 19 people contained 12 women and 8 blacks. Paradoxically, the approximate proportions of women and blacks in the total NSF personnel pool suggested by this reduction in force, if it were being carried out equitably, would be that $\frac{3}{5}$ of NSF personnel were women and $\frac{1}{2}$ were black.

Because of the questions this and other incidents have raised, the Committee directs the NSF to prepare an affirmative action status report and present it to the Committee no later than November 1, 1984. The purposes of the report are to:

- Establish the present baseline of affirmative action at the Foundation and compare those efforts with other Federal science agencies;

- Determine what needs to be done in the future; and

- Learn how officials plan to increase the number of women, minorities, and the handicapped in senior level positions.

Discussion

The Members of the Committee would like to obtain a complete picture of the status of affirmative action within the NSF. A complete picture includes, but is not limited to:

- The absolute number and proportion of women, minorities, and handicapped individuals at each GS and SES level within the Foundation;

- The number and proportion of women, minorities, and handicapped who head directorates, sections, or hold other senior level positions;

- The reduction in force history over the past four years, including the number, GS or SES level, and proportion of women, minorities and handicapped affected;

- The hiring history over the past four years and its impact on representation of women, minorities and handicapped;

- The methods by which the public is informed of job openings;

- The number of equal employment opportunity and affirmative action complaints filed by employees of the Foundation during the past four years and the minimum, maximum and average time taken to resolve these complaints;

- In the past year, the number of informal and formal complaints submitted to and resolved by the EEO office; and

The number of formal complaints not resolved at the Foundation level and referred either to EEOC or to litigation in the past year.

Data should be submitted for women, handicapped, blacks, Hispanics, American Indians, and U.S. born Asian Americans.

Moreover, the Committee would like to know:

The affirmative action plan;

How effectively the Foundation has met the objectives of its plan;

Positive steps taken to remedy the under-representation of women, minorities and the handicapped at the Foundation; and

Obstacles confronting present and future Foundation efforts to increase the representation of these groups among the ranks of its senior personnel.

16. JAPANESE LITERATURE TRANSLATION

Committee view

Japan now ranks high as a world economic power. In the last decade, it has become a net exporter of new technologies. It is home to the largest per capita research labor force. It has made the advancement of civilian science and technology a central focus of its national policy. U.S. science and technology is no longer alone in its superior accomplishments, and therefore must learn to integrate other advanced nations' work into its own efforts. This integration can only take place through the exploration of technological developments in other advanced nations, particularly Japan.

However, it has come to the Committee's attention that the quantity and quality of Japanese scientific and technological literature translation in the U.S. may be lagging far behind demand. The Committee realizes that without the translation of these materials, U.S. scientists and technologists in the Federal government and private industry cannot keep abreast of recent Japanese developments.

Therefore, the Committee directs the NSF, in consultation with other agencies, such as the Office of Productivity, Technology and Innovation in the Department of Commerce, to submit to the Congress by February 1985, a report including:

(1) An analysis of U.S. capabilities with regard to translation of Japanese scientific and technical literature, in the Federal agencies and the private sector;

(2) Suggestions for improving the effectiveness of Federal efforts in Japanese literature translation, including the consideration of the dissemination and production of information, as well as possible duplication of effort; and

(3) Options for reducing translation barriers, such as national and international copyright laws, manpower and funding shortages, and Japanese scientific and technical information policies.

17. NSF ROLE IN THE INTERNATIONAL GEOSPHERE BIOSPHERE PROGRAM

Committee view

Recent experiences in studying such major environmental problems as the carbon dioxide "greenhouse" effect have demonstrated the importance of analyzing and qualifying interactions which occur at the interfaces between the atmosphere, the oceans, the land masses, and biological organisms. These interfaces often account for the major uncertainties in resolving technical and scientific problems and in defining options for remedial actions.

The International Geosphere Biosphere Program (IGBP), recently described by the National Academy of Sciences, offers the opportunity to develop greater cooperation between traditional scientific disciplines in building a framework which will focus on understanding the interactions between major systems. Patterned after the highly successful International Geophysical Year in 1957-58, the IGBP emphasizes the need to achieve participation by other countries as well as by other relevant Federal agencies.

The Committee has examined the NSF's programs and has concluded that these have the potential to make a major contribution to the IGBP. It is crucial to draw upon the strengths of the academic community in formulating the U.S. role in this program. Resources spent by the NSF in these areas will achieve a substantially greater value if coordinated with an overall observation and research effort.

The Committee urges the NSF to cooperate with other agencies to support the IGBP in defining its scope and objectives and in developing future plans. The Committee looks with anticipation to the international acceptance of the IGBP as a meaningful framework within which resources can be focused.

18. BIOLOGICAL, BEHAVIORAL, AND SOCIAL SCIENCES (BBS)

Committee view

There are several initiatives underway in Federal agencies directed toward the field of biotechnology. The Foundation's focus in this regard is that of a more fundamental research level. First, NSF programs under BBS direct research on the advancement of the basic understanding of biological and chemical processes in plant matter and secondly, the application of genetic approaches for examination of fundamental plant processes. The use of such molecular genetic techniques in the field of systematic and population biology is a unique and valuable contribution to the scientific field.

Concerned with the need for Federal coordination and the environmental implications of genetic engineering, two Subcommittees on the Science and Technology Committee held a hearing on June 22, 1983, to examine these issues. That hearing indicated a very diverse Federal effort exists in plant biology, genetic engineering, biotechnology and the Federal regulatory process. At that time, the National Institutes of Health (NIH) Recombinant DNA Advisory Committee (RAC) lacked sufficient ecological expertise to evaluate field test proposals. There appears to be some deficiency in the microbial ecology field as well. In each of these areas, the NSF offers

the necessary kind of expertise. Therefore, the Committee encourages the Foundation to cooperate with NIH and the mission-oriented Federal agencies in the exchange and dissemination of technical information.

With respect to the Postdoctoral Research Fellowships in the Plant Biology Program, the Committee is pleased to see that BBS has continued and expanded these fellowships in fiscal year 1984 and 1985. The Committee views this program as a link between the wide range of biological and physical scientists not trained in the more traditional plant sciences. During the 1970s, the focus in the biological sciences became subject-specific, at the expense of understanding organisms as part of an integrated system. The research on environmental pollutants exemplifies this trend. For some time, research projects have focused on single trace elements of toxic substances, essentially ignoring the interaction of more than one element. This is contrary to the processes occurring in the atmosphere and hence there has been a major thrust toward an integrated approach. Likewise, the field of plant sciences is returning to a greater emphasis on the entire system. The Committee, therefore, supports the Foundation's efforts to meet this challenge.

19. ASTRONOMICAL, ATMOSPHERIC, EARTH, AND OCEAN SURFACES

Committee view

In several research efforts supported by the Foundation, there is a natural link to programs underway and proposed by the National Oceanographic and Atmospheric Administration (NOAA) and the National Aeronautics and Space Administration (NASA). Examples of such programs are the space science program at NASA, and the National Climate Program, the Prototype Regional Observation Forecasting System (PROFS), the Global Atmospheric Research Program (GARP), and meteorological satellites at NOAA. The funding levels of these mission agency programs could affect the research funded in the related NSF activities. Therefore, the Committee requests that it be kept informed about the potential impact of recommended funding changes which would affect the vitality of NSF supported research.

III. EXPLANATION OF COMMITTEE AMENDMENTS

The amendment in the nature of a substitute adopted by the Committee is presented at the beginning of this report.

EXPLANATION

The Committee adopted an amendment in the nature of a substitute which:

(1) Authorizes a total of \$1,560,292,000 for operations of the National Science Foundation for fiscal year 1985. This authorization is \$58,500,000 above the Administration's request for fiscal year 1985, and is an increase of \$238,981,000 or 18 percent over the amount appropriated to the foundation in fiscal year 1984. The funds are to be distributed as follows:

(a) Mathematical and Physical Sciences.—The Committee approved the Administration request of \$416.7 million.

(b) Engineering.—The Committee approved the Administration request of \$147.1 million.

(c) Biological, Behavioral and Social Sciences.—The Committee provided an increase of \$5.0 million above the Administration request, for a total of \$258.1 million. Further discussion is contained in the Committee Views.

(d) Astronomical, Atmospheric, Earth and Ocean Sciences.—The Committee approved the Administration request of \$373.5 million.

(e) U.S. Antarctic Program.—The Committee approved the Administration request of \$115.1 million.

(f) Scientific, Technological, and International Affairs.—The Committee provided an increase of \$5.5 million above the Administration request, for a total of \$52.4 million. This is to reinstate the Experimental Program to Stimulate Competitive Research (EPSCoR) at a level of \$3 million, and to increase the Research Improvement in Minority Institutions (RIMI) program by \$2.5 million. Further discussion on both of these actions is contained in the Committee Views.

(g) Program Development and Management.—The Committee approved the Administration request of \$70.9 million.

(h) Advanced Scientific Computing.—The Committee provided an increase of \$40.0 million above the \$20.0 million distributed among the Directorates in the Administration request. This results in total funding of \$60.0 million for Advanced Scientific Computing. Further discussion is contained in the Committee Views.

(i) Science and Engineering Education.—The Committee provided an increase of \$8.0 million above the Administration request, for a total of \$83.7 million. This increase is for Graduate Research Fellowships. Further discussion is contained in the Committee Views.

(j) Special Foreign Currency.—The Committee approved the Administration request of \$2.8 million.

(2) Requires that, of the funds authorized for Biological, Behavioral and Social Sciences, not less than \$73.9 million shall be available to the Behavioral and Neural Sciences Division and the Social and Economic Sciences Division, and not less than \$8.0 million shall be available to the Information Science and Technology Division. Further discussion is contained in the Committee Views.

(3) Requires that, if the funds appropriated are less than the amount authorized, the funds are to be apportioned among activities in the same proportion as they are apportioned in the authorization bill.

(4) Provides that funds may be transferred among categories, but precludes transfers to or from any category exceeding 10 percent of the amount listed for that category until either: (a) thirty calendar days have passed after the Director has notified the Speaker, the Vice President, and the Senate and the reason for it, or (b) the authorization committees in both Houses have written the Director that they have no objection to the transfer.

(5) Amends the last sentence of section 4(e) of the National Science Foundation Act of 1950 by removing the words requiring that National Science Board members be notified of meetings by regis-

tered or certified mail. The requirement serves no useful purpose since regular Board meetings are scheduled months in advance. In addition, a formal certified mail notice is becoming technologically obsolete.

(6) Amends sections 9 (a) and (b) of the National Science Foundation Act to allow the National Science Board more flexibility in establishing special commissions authorized under section 4(h) of the Act.

(a) The amendment to section 9(a) authorizes the Board discretion in fixing the size and composition of a special commission, rather than limiting it to six scientists and five non-scientists.

(b) The amendment to section 9 authorizes the Board to establish special commissions to study and make recommendations on any issues relating to the principal areas of responsibility of the National Science Foundation, rather than restricting them to a particular scientific field of study.

(7) Amends section 12 of the National Science Foundation Act by deleting subsection (b), which bans National Science Foundation employees from owning United States patents on inventions resulting from their work at the Foundation. The requirement serves no useful purpose since the Foundation performs no in-house research.

(8) Deletes subsection 14(b) of the National Science Foundation Act of 1950 to remove an unnecessary limitation on the activities of senior Foundation officials. The language of subsection 14(b) forbids the Director, Deputy Director, and Assistant Directors from engaging "in any other business, vocation, or employment while serving in such position," thereby precluding such positions from being held by part-time officers. The Foundation clearly is of a size that could not now feasibly be run by part-time officials, and the provision is unnecessary. Also, the language casts some doubt on the right of the National Science Foundation Director, Deputy Director, or an Assistant Director to have outside interests such as would be permitted to other full-time government executives.

(9) Deletes section 6 of Public Law 95-99, to remove unnecessary codification of this section of the National Science Foundation Authorization Act of 1978. The section directed the Foundation to establish a Resource Center for Science and Engineering; four have been established. No other specific programs of the Foundation have been permanently codified. Also, authority for establishing such centers is now covered under the Science and Technology Equal Opportunities Act.

(10) Deletes section 10 of Public Law 95-99, to remove codification of a requirement that National Science Foundation employees disclose any financial interests or academic affiliations that might bear on their handling of proposals or applications. The requirement has been superseded by the Ethics in Government Act, and is therefore unnecessary.

(11) Amends the National Science Foundation Act of 1950 in several places, to include fundamental engineering research and engineering education in the Foundation's mission.

(a) Section 3(a)(1) of the Act is amended to state that the Foundation is authorized and directed—

(1) to initiate and support basic scientific research and programs to strengthen scientific research potential and science education programs at all levels in the mathematical physical, medical, biological, social, and other sciences, and to initiate and support research fundamental to the engineering process and programs to strengthen engineering research potential and engineering education programs at all levels in the various fields of engineering.

(b) Sections 3(a) (2), (3), (4), (5), (6), (7); 3(b); 3(c); 3(d); 3(e); 4(c); sections 10, 11, 12, 13, 14; section 15(b); and section 2(b) of Public Law 94-86 are all amended by addition of words to conform them to the intent expressed in section 3(a)(1).

(c) States the amendments made by this section shall be effective on the date of the enactment of this Act.

(12) Restricts the authorization period to fiscal year 1985.

IV. CHANGES IN EXISTING LAW MADE BY THE BILL, AS REPORTED

In compliance with clause 3 of Rule XIII of the Rules of the House of Representatives, changes in existing law made by the bill, as reported, as are shown as follows (existing law proposed to be omitted is enclosed in back brackets, new matter is printed in italic, existing law in which no change is proposed is shown in roman):

NATIONAL SCIENCE FOUNDATION ACT OF 1950

FUNCTIONS OF THE FOUNDATION (42 U.S.C. § 1862)

SEC. 3. (a) The Foundation is authorized and directed—

(1) to initiate and support basic scientific and research and programs to strengthen scientific research potential and science education programs at all levels in the mathematical, physical medical, biological [engineering,] social, and other sciences, *and to initiate and support research fundamental to the engineering process and programs to strengthen engineering research potential and engineering education programs at all levels in the various fields of engineering*, by making contracts or other arrangements (including grants, loans, and other forms of assistance) to support such scientific and educational activities and to appraise the impact of research upon industrial development and upon the general welfare;

(2) to award, as provided in section 10, scholarships and graduate fellowships in the mathematical, physical, medical, biological, engineering, social, and other sciences;

(3) to foster the interchange of scientific *and engineering* information among scientists *and engineers* in the United States and foreign countries;

(4) to foster and support the development and use of computer and other scientific methods and technologies, primarily for research and education in the sciences *and engineering*;

(5) to evaluate the status and needs of the various sciences *and fields of engineering* as evidenced by programs, projects,

and studies undertaken by agencies of the Federal Government, by individuals, and by public and private research groups, employing by grant or contract such consulting services as it may deem necessary for the purpose of such evaluations; and to take into consideration the results of such evaluations in correlating the research and educational programs undertaken or supported by the Foundation with program projects, and studies undertaken by agencies of the Federal Government, by individuals, and by public and private research groups;

(6) to maintain a current register of scientific and [technical] *engineering* personnel, and in other ways to provide a central clearing house for the collection, interpretation, and analysis of data on the availability of, and the current and projected for, scientific and [technical] *engineering* resources in the United States, and to provide a source of information for policy formulation by other agencies of the Federal Government; and

(7) to initiate and maintain a program for the determination of the total amount of money for scientific *and engineering* research including money allocated for the construction of the facilities wherein such research is conducted, received by each educational institution and appropriate nonprofit organization in the United States, by grant, contract, or other arrangement from agencies of the Federal Government, and to report annually thereon to the President and the Congress.

(b) The Foundation is authorized to initiate and support specific scientific *and engineering* activities in connection with matters relating to international cooperation, national security, and the effects of scientific *and engineering* applications upon society by making contracts or other arrangements (including grants, loans, and other forms of assistance) for the conduct of such activities. When initiated or supported pursuant to requests made by any other Federal department or agency, including the Office of Technology Assessment, such activities shall be financed whenever feasible from funds transferred to the Foundation by the requesting official as provided in section 14(g), and any such activities shall be unclassified and shall be identified by the Foundation as being undertaken at the request of the appropriate official.

(c) In addition to the authority contained in subsections (a) and (b), the Foundation is authorized to initiate and support scientific *and engineering* research, including applied research, at academic and other nonprofit institutions. When so directed by the President, the Foundation is further authorized to support, through other appropriate organizations, applied scientific *research and engineering research* relevant to national problems involving the public interest. In exercising the authority contained in this subsection, the Foundation may employ by grant or contract such consulting services as it deems necessary, and shall coordinate and correlate its activities with respect to any such problem with other agencies of the Federal Government undertaking similar programs in that field.

(d) The Board and the Director shall recommend and encourage the pursuit of national policies for the promotion of [basic re-

search and education in the sciences] *research and education in science and engineering.*

(e) In exercising the authority and discharging the functions referred to in the foregoing subsections, it shall be one of the objectives of the Foundation to strengthen research and education in the sciences *and engineering* including independent research by individuals, throughout the United States, and to avoid undue concentration of such research and education.

NATIONAL SCIENCE BOARD (42 U.S.C. § 1863)

SEC. 4. (a) The Board shall consist of twenty-four members to be appointed by the President, by and with the advice and consent of the Senate, and of the Director *ex officio*. In addition to any powers and functions otherwise granted to it by this Act, the Board shall establish the policies of the Foundation within the framework of applicable policies as set forth by the President and the Congress.

(b) The Board shall have an Executive Committee as provided in section 7, and may delegate to it or to the Director or both such of the powers and functions granted to the Board by this Act as it deems appropriate.

(c) The persons nominated for appointment as members of the Board (1) shall be eminent in the fields of the basic, medical or social sciences, engineering, agriculture, education, research management or public affairs; (2) shall be selected solely on the basis of established records of distinguished service, and (3) shall be so selected as to provide representation of the views of scientific *and engineering* leaders in all areas of the Nation. In making nominations under this section, the President shall give due regard to equitable representation of scientists *and engineers* who are women or who represent minority groups. The President is requested, in the making of nominations of persons for appointment as members, to give due consideration to any recommendations for nomination which may be submitted to him by the National Academy of Sciences, *the National Academy of Engineering*, the National Association of State Universities and Land Grant Colleges, the Association of American Universities, the Association of American Colleges, the Association of State Colleges and Universities, or by other scientific, *engineering*, or educational organizations.

(d) The term of office of each member of the Board shall be six years; except that any member appointed to fill a vacancy occurring prior to the expiration of the term for which his predecessor was appointed shall be appointed for the remainder of such term. Any person, other than the Director, who has been a member of the Board for twelve consecutive years shall thereafter be ineligible for appointment during the two-year period following the expiration of such twelfth year.

(e) The Board shall meet annually on the third Monday in May unless, prior to May 10 in any year, the Chairman has set the annual meeting for a day in May other than the third Monday and at such other times as the Chairman may determine, but he shall also call a meeting whenever one-third of the members so request in writing. A majority of the members of the Board shall constitute a quorum. Each member shall be given notice [by registered mail

or certified mail mailed to his last known address of record] not less than fifteen days prior to any meeting, of the call of such meeting.

SPECIAL COMMISSIONS (42 U.S.C. § 1868)

[SEC. 9. (a) Each special commission established pursuant to section 4(i) shall consist of eleven members appointed by the Board, six of whom shall be eminent scientists and five of whom shall be persons other than scientists. Each special commission shall choose its own chairman and vice chairman.

[(b) It shall be the duty of each such special commission to make a comprehensive survey of research, both public and private, being carried on in its field, and to formulate and recommend to the Foundation at the earliest practicable date an over-all research program in its field.]

SEC. 9. (a) Each special commission established under section 4(h) shall be appointed by the Board, and shall consist of such members as the Board considers appropriate.

(b) Special commissions may be established to study and make recommendations to the Foundation on issues relating to research and education in science and engineering.

SCHOLARSHIPS AND GRADUATE FELLOWSHIPS (42 U.S.C. § 1869)

SEC. 10. The Foundation is authorized to award, within the limits of funds made available specifically for such purpose pursuant to section 16, scholarships and graduate fellowships for [scientific study or scientific work in the mathematical, physical, medical, biological, engineering, social, and other sciences] *study and research in the sciences or in engineering* at appropriate nonprofit American or nonprofit foreign institutions selected by the recipient of such aid, for stated periods of time. Persons shall be selected for such scholarships and fellowships from among citizens or nationals of the United States, and such selections shall be made solely on the basis of ability; but in any case in which two or more applicants for scholarships or fellowships, as the case may be, are deemed by the Foundation to be possessed of substantially equal ability, and there are not sufficient scholarships or fellowships, as the case may be, available to grant one to each of such applicants, the available scholarship or scholarships or fellowship or fellowships shall be awarded to the applicants in such manner as will tend to result in a wide distribution of scholarships and fellowships throughout the United States. Nothing contained in this Act shall prohibit the Foundation from refusing or revoking a scholarship or fellowship award, in whole or in part, in the case of any applicant or recipient, if the Board is of the opinion that such award is not in the best interests of the United States.

GENERAL AUTHORITY OF FOUNDATION (42 U.S.C. § 1870)

SEC. 11. The Foundation shall have the authority, within the limits of available appropriations to do all things necessary to carry out the provisions of this Act, including, but without being limited thereto, the authority—

(a) * * *

* * * * *

(c) to enter into contracts or other arrangements, or modifications thereof, for the carrying on, by organizations or individuals in the United States and foreign countries, including other government agencies of the United States and of foreign countries, of such scientific or *engineering* activities as the Foundation deems necessary to carry out the purposes of this Act, and, at the request of the Secretary of State or Secretary of Defense, specific scientific or *engineering* activities in connection with matters relating to international cooperation or national security, and, when deemed appropriate by the Foundation, such contracts or other arrangements or modifications thereof, may be entered into without legal consideration, without performance or other bonds and without regard to section 3709 of the Revised Statutes (41 U.S.C. § 5);

* * * * *

(g) to publish or arrange for the publication of scientific, *engineering*, and technical information so as to further the full dissemination of information of scientific value consistent with the national interest, without regard to the provisions of section 87 by the Act of January 12, 1895 (28 Stat. 622), and section 11 of the Act of March 1, 1919 (40 Stat. 1270; 44 U.S.C. § 103 and first sentence of § 501);

* * * * *

(i) to prescribe, with the approval of the Comptroller-General of the United States, the extent to which vouchers for funds expended under contracts for scientific or *engineering* research shall be subject to itemization or substantiation prior to payment, without regard to the limitations of other laws relating to the expenditure of public funds and accounting therefor; and

(j) to arrange with and reimburse the heads of other Federal agencies for the performance of any activity which the Foundation is authorized to conduct.

PATENT RIGHTS (42 U.S.C. § 1871)

SEC. 12. [(a)] Each contract or other arrangement executed pursuant to this Act which relates to scientific or *engineering* research shall contain provisions governing the disposition of inventions produced thereunder in a manner calculated to protect the public interest and the equities of the individual or organization with which the contract or other arrangement is executed: *Provided, however,* That nothing in this Act shall be construed to authorize the Foundation to enter into any contractual or other arrangement inconsistent with any provision of law affecting the issuance or use of patents.

[(b)] No officer or employee of the Foundation shall acquire, retain, or transfer any rights, under the patent laws of the United States or otherwise, in any invention which he may make or produce in connection with performing his assigned

activities and which is directly related to the subject matter thereof: *Provided, however,* That this subsection shall not be construed to prevent any officer or employee of the Foundation from executing any application for patent on any such invention for the purpose of assigning the same to the Government or its nominee in accordance with such rules and regulations as the Director may establish.】

INTERNATIONAL COOPERATION AND COORDINATION WITH FOREIGN
POLICY (42 U.S.C. § 1872)

SEC. 13. (a) The Foundation is hereby authorized to cooperate in any international scientific or *or engineering* activities consistent with the purposes of this Act and to expend for such international scientific *engineering* activities such sums within the limit of appropriated funds as the Foundation may deem desirable. The Director may defray the expenses of representatives of Government agencies and other organizations and of individual scientists *or engineers* to accredited international scientific *or engineering* congresses and meetings whenever he deems it necessary in the promotion of the objective of this Act. In this connection, with the approval of the Secretary of State, the Foundation may undertake programs, granting fellowships to, or making other similar arrangements with, foreign nationals for scientific *or engineering* study or scientific *or engineering* work in the United States without regard to section 10 or the affidavit of allegiance to the United States required by section 15(d)(2) of this Act.

(b)(1) The authority to enter into contracts or other arrangements with organizations or individuals in foreign countries and with agencies of foreign countries, as provided in section 11(c), and the authority to cooperate in international scientific *or engineering* activities as provided in subsection (a) of this section, shall be exercised only with the approval of the Secretary of State, to the end that such authority shall be exercised in such manner as is consistent with the foreign policy objectives of the United States.

(2) If, in the exercise of the authority referred to in paragraph (1) of this subsection, negotiation with foreign countries or agencies thereof becomes necessary, such negotiation shall be carried on by the Secretary of State in consultation with the Director.

MISCELLANEOUS PROVISIONS (42 U.S.C. § 1873)

SEC. 14. (a) * * *

【(b) Neither the Director, the Deputy Director, nor any Assistant Director shall engage in any other business, vocation, or employment while serving in such position; nor shall the Director, the Deputy Director, or any Assistant Director, except with the approval of the Board, hold any office in, or act in any capacity for, any organization, agency, or institution with which the Foundation makes any grant, contract, or other arrangement under this Act.】

* * * * *

(f) In making contracts or other arrangements for scientific *or engineering* research, the Foundation shall utilize appropriations available therefor in such manner as will in its discretion best real-

ize the objectives of (1) having the work performed by organizations, agencies, and institutions, or individuals in the United States or foreign countries, qualified by training and experience to achieve the results desired, (2) strengthening the research staff of organizations, particularly nonprofit organizations, in the United States, (3) aiding institutions, agencies, or organizations which, if aided, will advance scientific or *engineering* research, and (4) encouraging independent scientific or *engineering* research by individuals.

(g) Funds available to any department or agency of the Government for scientific or [technical] *engineering* research, or the provision of facilities therefor, shall be available for transfer, with the approval of the head of the department or agency involved, in whole or in part, to the Foundation for such use as is consistent with the purposes for which such funds were provided, and funds so transferred shall be expandable by the Foundation for the purposes for which the transfer was made.

* * * * *

SECURITY PROVISIONS (42 U.S.C. § 1874)

SEC. 15. (a) * * *

(b)(1) In the case of scientific or [technical] *engineering* research activities under this Act in connection with matters relating to the national defense, with respect to which funds have been transferred to the Foundation from the Department of Defense in accordance with the provisions of section 14(g) of this Act, the Secretary of Defense shall establish such security requirements and safeguards, including restrictions with respect to access to information and property, as he deems necessary.

(2) In the case of scientific or *engineering* research activities under this Act in connection with matters relating to the national defense other than research activities referred to in paragraph (1) of this subsection, the Foundation shall establish such security requirements and safeguards, including restrictions with respect to access to information and property as it deems necessary.

* * * * *

NATIONAL SCIENCE FOUNDATION AUTHORIZATION ACT, FISCAL YEAR 1978

* * * * *

[SEC. 6.(a) The National Science Foundation shall establish a Resource Center for Science and Engineering to be located at an education institution which—

[(1) enrolls substantial numbers of minority students, students from low-income families, or both;

[(2) is geographically located near one or more population centers of low-income families or minority groups;

[(3) demonstrates a commitment to encouraging and assisting minority students or students from low-income families, or both; and

[(4) has an existing or developing capacity to offer doctoral programs in science and engineering.

[(b) The Center established under this section shall—

[(1) support basic research and the acquisition of necessary research facilities and equipment;

[(2) serve as a regional resource in science and engineering for the community which the Center serves; and

[(3) develop joint educational programs with nearby pre-college and undergraduate institutions which enroll a substantial number of minority students or students from low-income families.

* * * * *

[SEC. 10. (a)(1) Each officer or employee of the National Science Foundation who performs a decisionmaking function in the handling of any application or proposal for a grant from or contract with the Foundation shall provide a written statement for the record identifying (in accordance with the standards promulgated under subsection (b) any financial interest or other relevant interest he or she has in the person submitting the application or proposal and any academic affiliation he or she has with that person. If the application or proposal results in an award, the statement shall be made available to the public.

[(2) The Director shall remove or take other appropriate disciplinary action against any employee who knowingly violates the requirements of this subsection.

[(b)(1) Within 60 days after the date of the enactment of this Act, the Director of the National Science Foundation shall publish—

[(A) proposed standards to implement the requirements of subsection (a), designed to minimize conflicts of interest and to assure that the appropriate files of the Foundation relating to any grant or contract referred to in such subsection contain a statement of any financial or other relevant interest which any of the officers and employees involved may have in the person or institution applying for or proposing the grant or contract as well as any academic affiliation which any of such officers and employees may have with such person or institution; and

[(B) proposed standards appropriately requiring identification of any conflicts of interest by peer reviewers.

[(2) Within 120 days after the date of the enactment of this Act, the Director shall promulgate the standards published under paragraph (1), with such modifications as the Director may deem appropriate; and such standards shall take effect upon their promulgation.

[(c) The Director shall report annually to the Congress on the administration and enforcement of this section.

[(d) If the President issues an Executive order that requires financial disclosure by officers and employees of Federal agencies generally, only so much of this section as relates to peer reviewers and to academic affiliation of officers and employees shall remain effective.]

* * * * *

SECTION 2 OF PUBLIC LAW 94-86

AN ACT Authorizing appropriations to the National Science Foundation for fiscal year 1976

SEC. 2. (a) * * *

(b) After the date of enactment of this Act the Director of the National Science Foundation, shall require, as a condition of any award made by the National Science Foundation for the purpose of precollege science or engineering curriculum development activities, that the awardee, and any subcontractors involved in the distribution, marketing, or selling of such science or engineering curricula, shall include in any testing agreement, sales contract, or other comparable legal instrument a provision requiring that all instructional materials, including teacher's manuals, films, tapes, or other supplementary instructional materials developed or provided under such award, subcontract, or other legal instrument, will be made available within the school district using such materials for inspection by parents or guardians of children engaged in educational programs or projects of that school district. In addition, the Director of the National Science Foundation shall take such action as may be necessary and feasible to modify awards made for the purpose of precollege science or engineering curriculum development and implementation activities on or before the date of enactment of this Act to include such a provision in all possible cases.

* * * * *

V. SECTIONAL ANALYSIS OF THE BILL, H.R. 4974

A bill to authorize appropriations for activities of the National Science Foundation for fiscal year 1985.

Section 2(a).—Authorizes appropriations to the National Science Foundation for fiscal year 1985, in the following categories:

	<i>Thousands</i>
1. Mathematical and physical sciences.....	\$416,710,000
2. Engineering	147,100,000
3. Biological, behavioral, and social sciences.....	258,120,000
4. Astronomical, atmospheric, earth and ocean sciences	373,480,000
5. U.S. Antarctic program.....	115,080,000
6. Scientific, technological, and international affairs.....	52,400,000
7. Program development and management	70,902,000
8. Science and engineering education	83,700,000

Section 2(b).—Authorizes an appropriation of \$40.0 million for Advanced Scientific Computing and directs that it be made available in addition to the \$20.0 million authorized by section 2(a) for that purpose.

Section 2(c).—Requires that not less than \$73.9 million of funds authorized under subsection (a)(3) shall be available to the Behavioral and Neural Sciences Division and the Social and Economic Sciences Division, and not less than \$8.0 million shall be available to the Information Science and Technology Division.

Section 3.—Makes appropriations under authority provided in sections 2 and 5 available for obligation for time periods specified in the appropriation bill.

Section 4.—Authorizes up to \$3,500 for official consultation, representation, or other extraordinary expenses at the discretion of the Director of the Foundation.

Section 5.—Authorizes up to \$2.8 million for expenses incurred by the Foundation outside the United States, to be drawn from excess foreign currencies.

Section 6.—States that if the appropriation is less than the total authorized, every program activity, and every floor in the authorization bill, should be reduced by a proportional amount. The only exceptions would be those specified in the Appropriations Act.

Section 7(a).—Permits transfer of funds between the categories in Section 2, up to 10 percent of the amounts authorized in those categories.

Section 7(b).—Permits the Director to transfer funds between the categories in section 2 exceeding 10 percent of the amounts authorized in those categories, provided an explanation of any such proposed transfer is transmitted in writing to the Speaker of the House, President of the Senate, and the appropriate authorizing Committees of the House and Senate, and (1) 30 calendar days have passed after the transmission of such request, or (2) the chairman of each of the appropriate authorizing Committees of the House and Senate have notified the Director of no objection to the proposed transfer.

Section 8(a).—Amends the National Science Foundation Act of 1950 to remove obsolete language requiring that National Science Board members be notified of meetings by certified or registered mail.

Section 8(b).—Changes the text of section 9 of the National Science Foundation Act of 1950 to provide more flexibility to the National Science Board in establishing special commissions authorized under section 4(h) of the Act.

Section 8(c).—Removes provision banning National Science Foundation employees from owning patents resulting from NSF-related work.

Section 8(d).—Removes language in the Act forbidding the Director, Deputy Director, or any Assistant Director from holding any other position or office while employed by NSF.

Section 8(e).—Repeals language in Public Law 95-99, the National Science Foundation Authorization Act of 1978, so as to remove unnecessary codification regarding Resource Centers for Science and Engineering.

Section 8(f).—Repeals language in Public Law 95-99, so as to remove unnecessary codification regarding financial disclosure.

Section 9.—Amends the National Science Foundation Act of 1950 in several places, to include fundamental engineering research and engineering education in the Foundation's mission as follows:

(a) Sec. 3(a)(1) of the Act is amended to state that the Foundation is authorized and directed—

- (1) to initiate and support basic scientific research and programs to strengthen scientific research potential and science education programs at all levels in the mathematical, physical, medical, biological, social, and other sciences, and to initiate and support research fundamental to

the engineering process and programs to strengthen engineering research potential and engineering education programs at all levels in the various fields of engineering.

(b) Sections 3(a) (2), (3), (4), (5), (6), (7); 3(b); 3(c); 3(d); 3(e); 4(c); sections 10, 11, 12, 13, 14; and section 15(b) of Public Law 81-507, as amended; and section 2(b) of Public Law 94-86 are all amended by addition of words to conform to the intent expressed in section 3(a)(1).

(c) States the amendments made by this section shall be effective on the date of the enactment of this Act.

VI. OVERSIGHT ACTIVITIES

HEARINGS

Testimony was given by NSF personnel or others on NSF related matters at oversight hearings held by the Committee between April 1983 and March 1984:

National Science Foundation authorization hearings

Posture Hearing on U.S. Science—February 1, 1984.

Director's Overview of NSF Budget request—February 3, 1984.

Explanation of NSF Programs by NSF officials—February 9, 1984.

Non-Government witnesses on NSF programs—February 28, 29, 1984.

Hearing on fundamental Engineering Research—March 21, 1984.

Other related hearings

Arctic Research and Policy Act of 1983—June 28, 1983.

Supercomputers—November 16, 1983.

Field Hearing, Science Education, Pittsburgh, Pennsylvania.—February 10, 1984.

Nobel Science Laureates—March 8, 1984.

Availability of Japanese Scientific Literature—March 6, 7, 1984.

Impact on Scientific Research of U.S. Withdrawal from UNESCO—March 15, 1984.

INSPECTION OF NSF SUPPORTED FACILITIES

NSF projects at the University of California, Berkeley; Lawrence Hall of Science, Berkeley; Stanford University; University of California, Riverside; California Institute of Technology; University of Arizona, and Kitt Peak National Observatory—August 5-13, 1983.

NSF activities at University of Southwestern Louisiana, Lafayette, Louisiana—August 18, 1983.

NSF projects at Cornell University, including Cornell Electron Storage Ring (CESR), Cornell High Energy Synchrotron Source (CHESS), Cornell Consortium for Continental Reflection Profiling (COCORP), and Cornell Materials Science Center (MSC)—December 20-21, 1983.

Antarctic Research Stations—December 5-10, 1983.

University Center for Atmospheric Research (UCAR) briefing held at the National Center for Atmospheric Research (NCAR), Boulder, Colorado—January 12-13, 1984.

ATTENDANCE AT NSF MEETINGS

Committee staff members have attended, or have studied reports of, numerous NSF meetings of the following types: National Science Board meetings, program reviews, program planning sessions, scientific conferences, meetings of the Committee on Equal Opportunities in Science and Technology, and advisory committee meetings.

They have also met with NSF personnel on a variety of working topics including: accountability in research and grant management; history, nature, and accomplishment of selected programs; evaluation procedures for grant proposals, amendments to NSF Organic Act, and Directorate-by-Directorate pre-budget reviews of programs, problems, and plans.

GAO REPORTS

Two General Accounting Office reports issued in the past year deal with the National Science Foundation:

"The Federal Role in Fostering University-Industry Cooperation"—May 25, 1983.

"New Directions for Federal Programs to Aid Mathematics and Science Teaching"—March 6, 1984.

VII. OVERSIGHT FINDINGS AND RECOMMENDATIONS BY THE COMMITTEE ON GOVERNMENT OPERATIONS

No statement of findings and recommendations on oversight activity pursuant to Rule X, clause 2(b)(2), and Rule XI, clause 2(1)(3)(D), of the Rules of the House of Representatives, have been submitted by the Committee on Government Operations for inclusion in this report.

VIII. CONGRESSIONAL BUDGET ACT COST ESTIMATE

U.S. CONGRESS,
CONGRESSIONAL BUDGET OFFICE,
Washington, D.C., March 26, 1984.

HON. DON FUQUA,
*Chairman, Committee on Science and Technology,
House of Representatives, Washington, D.C.*

DEAR MR. CHAIRMAN: The Congressional Budget Office has prepared the attached cost estimate for H.R. 4974, the National Science Foundation Authorization Act, Fiscal Year 1985.

If you wish further details on this estimate, we will be pleased to provide them.

Sincerely,

ERIC A. HANUSHEK,
(For Rudolph G. Penner, Director).

CONGRESSIONAL BUDGET OFFICE COST ESTIMATE

1. Bill number: H.R. 4974.
2. Bill title: The National Science Foundation Authorization Act, Fiscal Year 1985.

3. Bill status: As ordered reported by the House Committee on Science and Technology, March 22, 1984.

4. Bill purpose: The bill authorizes the appropriation of \$1,560 million for the National Science Foundation (NSF) for fiscal year 1985. The amount includes \$1,359 million for research and related activities, \$115 million for Antarctic research, and \$84 million for science education.

These amounts are \$59 million above the President's request for 1985 and \$239 million above the 1984 appropriation.

5. Estimated cost to the Federal Government:

[By fiscal years, in millions of dollars]

	1985	1986	1987	1988	1989
Estimated authorization level	1,560				
Estimated outlays.....	793	524	154	89	

The costs of this bill fall within budget function 250.

Basis of estimate

The estimate assumes that all funds authorized will be appropriated prior to the beginning of the fiscal year. The estimate of outlays is based on the program's historical spending patterns.

6. Estimated cost to State and local governments: None.

7. Estimate comparison: None.

8. Previous CBO estimate: None.

9. Estimate prepared by: Jeff Nitta.

10. Estimate approved by: C. G. Nuckols for James L. Blum, Assistant Director for Budget Analysis.

IX. IMPACT ON INFLATION

In accordance with Rule XI, clause 2(1)(4) of the Rules of the House of Representatives, the following statement is made concerning the inflationary impact of H.R. 4974.

H.R. 4974 is assessed to have no inflationary effect on prices and costs in the operation of the national economy.

X. COMMITTEE RECOMMENDATION

A quorum being present, the bill was ordered reported on March 22, 1984 by the Committee by a roll call vote of 24-14.

XI. ADMINISTRATION VIEWS

NATIONAL SCIENCE FOUNDATION,
OFFICE OF THE DIRECTOR,
Washington, D.C., February 8, 1984.

Hon. THOMAS P. O'NEILL, Jr.,
Speaker of the House of Representatives,
Washington, D.C.

DEAR MR. SPEAKER: I am pleased to forward a draft authorization bill for the National Science Foundation for fiscal years 1985 and 1986. Enclosed also is a sectional analysis of the bill.

This draft authorization bill is almost identical to that submitted for fiscal years 1983 and 1984. The amounts recommended for authorization are different, of course, but only two other changes were made. In section 6 of the draft bill, we have eliminated language purporting to empower our authorizing committees to waive the thirty day waiting period for transfers of funds to or from any spending category exceeding 10 percent of the amount authorized for that category in section 3. The Department of Justice advises that such provisions are unconstitutional under last summer's Supreme Court decision in *INS v. Chadha*. In section 7 of the draft bill, we have added three more amendments to the National Science Foundation Act to the four we proposed last year. All seven proposed amendments are described in the enclosed explanation of section 7.

The Office of Management and Budget has advised us that enactment of the proposed bill would be in accord with the program of the President.

Sincerely yours,

EDWARD A. KNAPP, *Director*.

Enclosures.

AUTHORIZATION BILL—FISCAL YEARS 1985 AND 1986

Be it enacted by the Senate and the House of Representatives of the United States of America in Congress assembled, That this Act may be cited as the "National Science Foundation Authorization Act for Fiscal Years 1985 and 1986."

SEC. 2. (a) There is authorized to be appropriated to the National Science Foundation \$1,498,992,000 for the fiscal year 1985 and such sums as may be necessary for the fiscal year 1986.

(b) Funds authorized for the fiscal year 1985 will be available for the following categories:

- (1) Mathematical and Physical Sciences, \$416,710,000.
- (2) Engineering, \$147,100,000.
- (3) Biological, Behavioral, and Social Sciences, \$253,120,000.
- (4) Astronomical, Atmospheric, Earth and Ocean Sciences, \$373,480,000.
- (5) United States Antarctic Program, \$115,080,000.
- (6) Scientific, Technological, and International Affairs, \$46,900,000.
- (7) Program Development and Management, \$70,902,000.
- (8) Science and Engineering Education, \$75,700,000.

SEC. 3. Appropriations made under authority provided in sections 2 and 5 shall remain available for obligation for periods specified in the Acts making the appropriations.

SEC. 4. From appropriations made under authorizations provided in this Act, not more than \$3,500 for fiscal year 1985 and such sums as may be necessary for fiscal year 1986 may be used for official consultation, representation, or other extraordinary expenses at the discretion of the Director of the National Science Foundation. His determination will be final and conclusive upon the accounting officers of the Government.

SEC. 5. Besides the sums authorized by section 2, not more than \$2,800,000 for fiscal year 1985 and such sums as may be necessary

for fiscal year 1986 are authorized to be appropriated for expenses of the National Science Foundation incurred outside the United States, to be drawn from foreign currencies that the Treasury Department determines to be excess to the normal requirements of the United States.

SEC. 6. Funds may be transferred among the categories listed in section 2(b), so long as the net funds transferred to or from any category do not exceed 10 percent of the amount authorized for that category in section 2. The Director of the Foundation may propose transfers to or from any category exceeding 10 percent of the amounts authorized for that category in section 2. An explanation of any such proposed transfer must be transmitted in writing to the Speaker of the House, the President of the Senate, the Senate Committee on Labor and Human Resources, and the House Committee on Science and Technology. The proposed transfer may be made only when thirty calendar days have passed after submission of the written proposal.

SEC. 7. (a) Section 9 of the National Science Foundation Act of 1950, as amended, is amended to read as follows:

"(a) Each special commission established under section 4(h) shall be appointed by the Board and shall consist of such members as the Board considers appropriate.

"(b) Special commissions may be established to study and make recommendations to the Foundation on issues relating to research and education in science and engineering."

(b) Section 6 of Public Law 95-99, the National Science Foundation Authorization Act for FY 1978, is deleted and the sections following it all renumbered accordingly.

(c) Section 10 of Public Law 95-99, the National Science Foundation Authorization Act for FY 1978, is deleted.

(d) Subsection 12(b) of the National Science Foundation Act of 1950, as amended, is deleted and the preceding subsection is redesignated by striking the "(a)".

(e) Section 4(e) of the National Science Foundation Act of 1950, as amended, is amended by deleting from the last sentence the words "by registered mail or certified mail mailed to his last known address of record".

(f) Subsection 14(b) of the National Science Foundation Act of 1950, as amended, is deleted.

(g) Subsection 5(e) of the National Science Foundation Act of 1950, as amended, is amended by changing the figure "\$2,000,000" to "\$6,000,000" and the figure "\$500,000" to "\$1,500,000".

SECTIONAL ANALYSIS—NSF FISCAL YEAR 1985-1986 AUTHORIZATION BILL

A bill to authorize appropriations for activities of the National Science Foundation, and for other purposes.

SEC. 1. Permits the citation of the Act as the "National Science Foundation Authorization Act for Fiscal Years 1985 and 1986."

SEC. 2. Authorizes appropriations in eight activities totaling \$1,498,992,000 for fiscal year 1985 and such sums as may be necessary for fiscal year 1986.

SEC. 3. Provides that appropriations made under sections 2 and 5 remain available for periods specified in appropriations acts.

SEC. 4. Authorizes expenditures of up to \$3,500 for fiscal year 1985 and such sums as may be necessary for fiscal year 1986 for official consultation, representation, and other extraordinary expenses at the discretion of the Director.

SEC. 5. Authorizes, besides the appropriations in section 2, an appropriation not to exceed \$2,800,000 for fiscal year 1985 and such sums as may be necessary for fiscal year 1986, for expenses of the National Science Foundation incurred outside the United States to be drawn from excess foreign currencies.

SEC. 6. Provides that funds may be transferred among categories but precludes transfers to or from any category exceeding 10 percent of the amount listed for that category until thirty calendar days have passed after the Director has notified the Speaker, the Vice President, and the Senate and House authorization committees of the nature of the transfer and the reason for it.

SEC. 7. Makes several amendments to the NSF Act.

Section 7 of NSF fiscal year 1985-86 authorization bill: proposed changes to National Science Foundation Act of 1950

The submitted bill would make seven amendments to the National Science Foundation Act and related laws. All the proposed changes would serve a broad long-term purpose. They represent a continued collaboration between the Foundation and the congressional committees charged with oversight of its activities to simplify and streamline its organic legislation.

Four of these amendments, Proposed Changes numbers 1 through 4, were submitted to Congress last year. They were approved by the House and by the Committee on Labor and Human Resources and the Committee on Commerce, Science, and Transportation in the Senate. The remaining three amendments are new.

Proposed change No. 1.—"Section 9 of the National Science Foundation Act of 1950, as amended, is amended to read as follows:

"(a) Each special commission established under section 4(h) shall be appointed by the Board and shall consist of such members as the Board considers appropriate.

"(b) Special Commissions may be established to study and make recommendations to the Foundation on issues relating to research and education in science and engineering."

Explanation of proposed change No. 1.—Section 4(h) of the National Science Foundation Act authorizes the National Science Board to establish "special commissions" from time to time as it may deem necessary for the purposes of the NSF Act. Such a commission can be a useful means of focusing the attention of distinguished scientists and other citizens on specific problems relating to science. However, limitations on the composition and duties of special commissions imposed in section 9 of the Act have unfortunately limited their value and therefore their use.

Section 9(b) of the NSF Act restricts any special commission to making a "comprehensive survey of research" and formulating and recommending to NSF an "over-all research program" for a particular scientific field of study. The Foundation believes that special

commissions would be more helpful and used more often if the commissions' writs could be drawn more broadly. The proposed amendment would authorize the Board to establish special commissions to study and make recommendations on any issues relating to the principal areas of responsibility of the National Science Foundation.

Section 9(a) restricts the membership of any special commission to six scientists and five nonscientists. Though this may be a good number and a good distribution for many cases, it is extraordinarily rigid. In many cases it would prevent selection of the best mix of scientists who are experts or specialists in the issues to be addressed, scientists who are not specialists in those issues, and nonscientists. The proposed amendment would allow the Board discretion to take account of the subject and the circumstances in fixing the size of a special commission and determining its composition.

No significant increase in cost or personnel will result if the proposal is enacted. Moreover, most, if not all, special commissions established would be subject to the requirements of the Federal Advisory Committee Act.

Proposed change No. 2.—"Section 6 of Public Law 95-99, the National Science Foundation Authorization Act for fiscal year 1978, is deleted and the sections following it all renumbered accordingly."

Explanation of proposed change No. 2.—Section 6 of Public Law 95-99 directed the Foundation to establish a Resource Center for Science and Engineering to be located at an educational institution. Four such centers have been funded.

This section of the Foundation's annual authorization act was permanently codified in the U.S. Code as 42 U.S.C. § 1884, apparently as a matter of codification committee routine. The Foundation sees no reason for this codification. No other specific programs of the Foundation initiated at the direction of the Congress have been permanently codified. Moreover, authority for establishing such centers is now covered under the Science and Technology Equal Opportunities Act (42 U.S.C. §§ 1885-1885d), making this section redundant. Deletion of the section will simplify the law.

No increase in cost or personnel will result if the proposal is enacted.

Proposed change No. 3.—"Section 10 of Public Law 95-99, the National Science Foundation Authorization Act for fiscal year 1978, is deleted."

Explanation of proposed change No. 3.—This lengthy provision, codified as 42 U.S.C. § 1873a, was added in 1977 to require NSF employees to disclose any financial interests or academic affiliations that might bear on their handling of proposals or other applications. It also required that the NSF adopt implementing regulations. It is unique, as no other non-regulatory agency of the Federal Government is subject to specific statutory requirements in this area. The broader disclosure requirements of the Ethics in Government Act are binding on all agencies, including the NSF. (In fact, under subsection (d), § 1873a(d), most of this section was superseded by the Ethics in Government Act.) Moreover, all agencies are required by Executive Order 11222 to maintain conflict-of-interests regulations that deal with any problems unique to their programs and methods of operation.

The Foundation's conflict-of-interests regulations were extensively revised recently (45 CFR Parts 680 through 684; published in the Federal Register, Vol. 47, No. 143, July 26, 1982, on pages 32130 through 32153). The new regulations require both disclosure of all potentially biasing affiliations or relationships and special oversight in cases involving them, with further special handling if necessary (45 CFR Part 681). The statutory provision is thus no longer necessary, and its deletion would simplify the law and allow more scope for future evolution of NSF policy in this area.

No increase in cost or personnel will result if the proposal is enacted.

Proposed change No. 4.—"Subsection 12(b) of the National Science Foundation Act of 1950, as amended, is deleted and the preceding subsection is redesignated by striking the '(a)'."

Explanation of proposed change No. 4.—Subsection 12(b) of the NSF Act, codified as 42 U.S.C. § 1871(b), bans an NSF employee from owning a United States patent on any invention made in connection with and directly relating to the subject matter of his or her assigned duties.

The Foundation is believed to be the only Federal agency to have a statutory provision governing the allocation of rights to inventions made by its employees. All other agencies are governed by Executive Order 10096, as amended, which permits Federal employee-inventors to retain principal patent rights to their inventions under certain circumstances. (See Section 1(c) of E.O. 10096 and the implementing regulations of the Patent and Trademark Office published at 37 CFR Part 100.) No reason is known for this special restriction on the Foundation's employees. The provisions probably resulted from a general congressional concern over the treatment of Federal employees' inventions, which President Harry Truman assuaged by issuing E.O. 10096 in January 1950, just four months before the NSF Act became law.

As far as can be determined, the provision has had no actual effect. The NSF, after all, performs no "in-house" research likely to produce inventions. Only one invention has ever been reported by a Foundation employee.

Deletion of this provision would simplify the law and remove an inequitable distinction between the Foundation's employees and those of other Federal agencies.

No increase in cost or personnel will result if the proposal is enacted.

Proposed change No. 5.—"Section 4(e) of the National Science Foundation Act of 1950, as amended, is amended by deleting from the last sentence the words 'by registered mail or certified mail mailed to his last known address of record'."

Explanation of proposed change No. 5.—Section 4(e) of the National Science Foundation Act now requires that National Science Board members be notified of meetings by registered or certified mail. The proposed amendment deletes that requirement, allowing such notice to be conveyed in any reasonable manner.

The requirement serves no useful purpose. Regular National Science Board meetings are scheduled months in advance, to give members time to adjust their teaching, research, and other responsibilities. The formal certified mail notice is a mere formality and

is becoming technologically obsolete as new communications methods are developed.

No increase in cost or personnel will result if the proposal is enacted.

Proposed change No. 6.—"Subsection 14(b) of the National Science Foundation Act of 1950, as amended, is deleted."

Explanation of proposed change No. 6.—This change is intended to remove an unnecessary limitation on the activities of senior Foundation officials.

Subsection 14(b) of the National Science Foundation Act of 1950, as amended, now provides:

Neither the Director, Deputy Director, nor any Assistant Director shall engage in any other business, vocation, or employment while serving in such position; nor shall the Director, the Deputy Director, or any Assistant Director, except with the approval of the [National Science] Board, hold any office in, or act in any capacity for, any organization, agency, or institution with which the Foundation makes any grant, contract, or other arrangement under this Act.

The provision dealt with one of the hotter issues at the time the NSF Act became law, but has outlived its purpose.

In 1947 President Truman vetoed the first National Science Foundation Act to pass the Congress because:

It would, in effect, vest the determination of vital national policies, the expenditure of large public funds, and the administration of important governmental functions in a group of individuals who would be essentially private citizens.

President Truman objected in particular to provisions in the bill that would have vested these powers in part-time members of the Foundation, their part-time Executive Committee, and part-time divisional committees for the major parts of the Foundation. "[R]esponsibility for the administration of the law should be vested in full-time officers who can be held accountable . . .", he said.

What is now section 14(b) of the National Science Foundation Act was added for the apparent purpose of ensuring that this objection was fully met. "The Director and his deputy," summarized the Senate Committee, "are to devote full-time to the Foundation." S. Rep. No. 1151, 80th Cong., 2d Sess. 5 (1948). Amendments to the Act in 1968 added four presidentially-appointed Assistant Directors and subjected them to the same bar on part-time service as the two top officials.

The original issue is now all but forgotten. No one doubts that the Director, Deputy Director, and Assistant Directors of the NSF are to be full-time Federal officials like their counterparts in any other Federal agency. Moreover, the Foundation has grown larger than was originally foreseen and could not now feasibly be run by part-time officials.

The sweeping language of the provision regarding "any other business, vocation, and employment" has remained, however, to cast some doubt on the right of an NSF Director, Deputy Director,

or Assistant Director to have outside interests such as would be permitted to other full-time Government executives. Section 210 of the Ethics in Government Act of 1978 (5 U.S.C. App. I) now curbs outside activities of such Presidentially appointed executives by limiting their outside earned income to 15 percent of Government salary. NSF executives need not be subject to additional restrictions. Removal of this now-outdated provision would simplify the Act and eliminate unnecessary legal questions.

No increase in cost or personnel will result if the proposal is enacted.

Proposed change No. 7.—"Subsection 5(e) of the National Science Foundation Act of 1950, as amended, is amended by changing the figure '\$2,000,000' to '\$6,000,000' and the figure '\$500,000' to '\$1,500,000'."

Explanation of proposed change No. 7.—This amendment is submitted at the request of the National Science Board, which believes the change would enable the Board to exercise more effectively its program review and oversight functions.

Subsection 5(e) now reads:

(e) The Director shall not make any contract, grant, or other arrangement pursuant to section 11(c) without the prior approval of the Board, except that a grant, contract, or other arrangement involving a total commitment of less than \$2,000,000 or less than \$500,000 in any one year or a commitment of such lesser amount or amounts and subject to such other conditions as the Board in its discretion may from time to time determine to be appropriate and published in the Federal Register, may be made if such action is taken pursuant to the terms and conditions set forth by the Board, and if each such action is reported to the Board at the Board meeting next following such action.

This provision was enacted in 1968, replacing a requirement in the original NSF Act that the Board approve all awards. Public Law 90-407, 82 Stat. 360, 363.

The proposed amendment trebles the maximum dollar amount of awards for which the Board may delegate approval authority to the Director. This change reflects inflation since 1968 and therefore merely restores the original real value.

No increase in cost or personnel will result if the proposal is enacted.

XII. BUDGET AS REQUESTED
National Science Foundation

Washington, D.C. 20550

FY 1985

Budget Summary

**to the
Congress**

NEW OBLIGATIONAL AUTHORITY

FY 1985 Budget Request \$1,501,792,000

FY 1984 Appropriation (P.L. 98-45) 1,320,300,000

Proposed Supplemental Appropriation Request 1,011,000

FY 1984 New Obligational Authority 1,321,311,000

Increase in New Obligational Authority FY 1985/FY 1984 . . . 180,481,000

Program Level

FY 1985 \$1,501,792,000

FY 1984:

Appropriation 1,320,300,000

Plus Proposed Supplemental Appropriation Request 1,011,000

Plus Carryover 14,631,790

FY 1984 Program Level 1,335,942,790

Increase in Program Level FY 1985/1984 \$165,849,210

NATIONAL SCIENCE FOUNDATION

FY 1985 BUDGET

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**NATIONAL SCIENCE FOUNDATION
TOTAL DOLLAR SUMMARY
FY 1983—FY 1985**

(Millions of Dollars)

	<i>Actual FY 1983</i>	<i>Request FY 1984</i>	<i>Current Plan FY 1984</i>	<i>Estimate FY 1985</i>	<i>Difference FY 1985/84</i>
Appropriations	1,093.5	1,292.3	1,321.3	1,501.8	180.5
Carryover	3.2	—0—	14.6	—0—	-14.6
Recoveries	4.1	—0—	—0—	—0—	—0—
Total Availability	1,100.8	1,292.3	1,335.9	1,501.8	165.9
Obligations	1,085.8	1,292.3	1,335.9	1,501.8	165.9
Lapses	0.4	—0—	—0—	—0—	—0—
Carry Forward	14.6	—0—	—0—	—0—	—0—

Explanation of Prior Year Carryover

In addition to the FY 1984 appropriation, an unobligated balance of \$14,631,790 is available for obligation in FY 1984. The distribution of these funds is:

- o No-Year Funds - Prior to FY 1974, NSF appropriations were made on a no-year basis and unobligated balances are available until expended. As a result of deobligation of previously made obligations, there is \$6,139 of these funds still available for obligation in FY 1984.
- o Program Development and Management - Funds allocated to approximately 350 individual accounts maintained on an organizational basis. Because of the necessity of maintaining balances in each of these accounts for obligations incurred through the end of the fiscal year, an overall unobligated balance of \$282,350 is available for obligation in FY 1985.
- o Program Funds - The unobligated balance of program funds from the Research and Related Activities appropriation is \$416,191 and resulted from balances of less than \$20,000 in each of the research activities plus \$367,000 originally planned to be used for NSF Planning and Evaluation. The total unobligated balance is shown in the FY 1985 Current Plan for the Scientific, Technological, and International Affairs activity and will be used in FY 1985 for planning projects.
- o Science and Engineering Education Activities - \$13,913,430 of unobligated FY 1983 appropriation remains available for obligation in FY 1984. Because of the expansion of these activities in FY 1983, the time required to develop specific programs and the time required for soliciting and reviewing proposals, the awards made in FY 1983 did not require all funds available. These unobligated funds will be used in FY 1984 for the planned FY 1983 activities.
- o Special Foreign Currency - A total of \$13,680 of unobligated FY 1983 funds will be utilized in the FY 1984 program.

NATIONAL SCIENCE FOUNDATION

SUMMARY OF FY 1985 BUDGET BY APPROPRIATION AND PROGRAM

	Actual FY 1983	Request FY 1984	Current Plan FY 1984	Estimate FY 1985	Difference FY 1985/84
Research and Related Activities Appropriation					
Mathematical and Physical Sciences	\$300,435,512	\$364,300,000	\$358,823,000	\$416,710,000	\$57,887,000
Engineering	101,130,585	123,000,000	120,723,000	147,100,000	26,377,000
Biological, Behavioral and Social Sciences	191,233,848	223,600,000	224,658,000	253,120,000	28,462,000
Astronomical, Atmospheric, Earth and Ocean Sciences	280,798,073	334,900,000	330,041,000	373,480,000	43,439,000
Scientific, Technological and International Affairs	44,127,409	38,800,000	40,822,330	46,900,000	6,077,670
Program Development and Management	85,696,973	66,000,000	66,592,350	70,902,000	4,309,650
Subtotal, Obligations	983,422,400	1,148,600,000	1,141,659,680	1,308,212,000	166,552,320
Funding Reconciliation					
Unobligated Balance Available, Start of Year	-2,347,330	-0-	-704,680	-0-	704,680
Unobligated Balance Available, End of Year	704,680	-0-	-0-	-0-	-0-
Adjustments to Prior Year Accounts	-4,048,877	-0-	-0-	-0-	-0-
Unobligated Balance Lapsing	372,842	-0-	-0-	-0-	-0-
Research and Related Activities Appropriation	978,103,715	1,148,600,000	1,140,955,000	1,308,212,000	167,257,000
U.S. Antarctic Program Activities					
U.S. Antarctic Research Program	8,996,285	10,000,000	10,244,400	11,000,000	755,600
Operations Support	74,200,000	92,100,000	92,211,600	104,080,000	11,868,400
U.S. Antarctic Program Activities	83,196,285	102,100,000	102,456,000	115,080,000	12,624,000
Science and Engineering Education Activities Appropriation					
Graduate Research Fellowships	14,978,167	19,000,000	20,300,000	21,000,000	700,000
Pre-College Science and Mathematics Education	1,108,403	20,000,000	54,700,000	54,700,000	-0-
Subtotal	16,086,570	39,000,000	75,000,000	75,700,000	700,000
FY 1983 Carryover	-0-	-0-	13,913,430	-0-	-13,913,430
Subtotal, Obligations	16,086,570	39,000,000	88,913,430	75,700,000	-13,213,430
Funding Reconciliation					
Unobligated Balance Available, Start of Year	-0-	-0-	-13,913,430	-0-	13,913,430
Unobligated Balance Available, End of Year	13,913,430	-0-	-0-	-0-	-0-
Adjustments to Prior Year Accounts	-0-	-0-	-0-	-0-	-0-
Unobligated Balance Lapsing	-0-	-0-	-0-	-0-	-0-
Science and Engineering Education Activities Appropriation	30,000,000	39,000,000	75,000,000	75,700,000	700,000
Special Foreign Currency Appropriation					
Research and Related Activities	3,084,975	2,800,000	2,913,680	2,800,000	-113,680
Subtotal, Obligations	3,084,975	2,800,000	2,913,680	2,800,000	-113,680
Funding Reconciliation					
Unobligated Balance Available, Start of Year	-918,067	-0-	-13,680	-0-	13,680
Unobligated Balance Available, End of Year	13,680	-0-	-0-	-0-	-0-
Adjustments to Prior Year Accounts	-26,466	-0-	-0-	-0-	-0-
Unobligated Balance Lapsing	45,878	-0-	-0-	-0-	-0-
Special Foreign Currency Appropriation	2,200,000	2,800,000	2,900,000	2,800,000	-100,000
TOTAL NSF APPROPRIATIONS	1,093,500,000	1,292,300,000	1,321,311,000	1,501,792,000	180,481,000

OVERVIEW AND HIGHLIGHTSNSF FY 1985 Budget Request

Science and technology are at the heart of international competitiveness and national security. The Nation must continue to maintain a vital scientific and engineering enterprise to assure continued future competitiveness of U.S. industry, as well as to assure a stable and secure defense. The National Science Foundation's (NSF) programs of fundamental research--carried out primarily at our Nation's universities--play a critical role in ensuring excellence in science and engineering and in training the best scientists and engineers for the future.

The FY 1985 Budget Request demonstrates the high priority the Administration has given to NSF in the achievement of national goals. It continues the trend of the past several years of providing significant growth in the Foundation's programs which have increased substantially since FY 1982.

The Foundation's FY 1985 Budget Request totals \$1,501.79 million, an increase of \$165.85 million or 12.4 percent above the FY 1984 Current Plan of \$1,335.94 million. It includes \$1,308.2 million for Research and Related Activities; \$115.08 million for the U.S. Antarctic Program; \$75.7 million for Science and Engineering Education; and \$2.8 million for Special Foreign Currency. This Budget Request:

- o Expands support for research of proven quality, including increased funding for equipment and state-of-the-art instrumentation, from \$197.0 million in FY 1984 to \$237 million; increases support for researchers at predominantly undergraduate institutions from \$36.8 million to \$42.4 million; and strengthens the training for the next generation of scientists and engineers.
- o Initiates support (\$10 million) for centers for cross-disciplinary research in engineering concerning subjects such as computer integrated manufacturing systems, voice and data communication systems, and biotechnology processing systems. The centers will integrate the teaching of engineering practice to undergraduate and graduate students with research experience and will provide for close interactions with industry.
- o Continues and expands the efforts begun in FY 1984 to address the needs of researchers in all disciplines for access to the most advanced computer systems (\$20.0M). Support is included for researchers with proven need and ability to use such systems. Funding is provided for networking capability, local user support, and facilities. Moreover, the National Center for Atmospheric Research (NCAR) will begin acquisition of an Advanced Vector

Computer (AVC) as a major step in upgrading the NCAR computing facility (\$5 million). The AVC will provide researchers in atmospheric and ocean sciences a system having five times the speed and ten times the memory of NCAR's current computing facility.

- o Begins the construction of the Very Long Baseline Array (VLBA) radio telescope for the Astronomical Sciences (\$15 million). The VLBA will be a unique world facility. No other telescope, existing or planned, will approach its resolution and sensitivity. The Astronomy Survey Committee of the National Academy of Sciences identified the VLBA as the highest priority major new program for ground based astronomy for the 1980s. Detailed design work on this facility began in FY 1984.
- o Continues the thrust in science and engineering education begun in FY 1984 (\$75.7 million). The principal emphasis is on the precollege activities where the proposed level for FY 1985 is approximately double that for FY 1980. In addition, a modest increase is provided for Graduate Research Fellowships. These fellowships recognize and support a small number of the Nation's most gifted young graduate students in science and engineering.

The Federal Role in Basic Research

In FY 1983, the Federal government provided \$6 billion or 67 percent of the total national investment in basic research. In the same year, the industrial sector accounted for 19 percent of the total. The remaining basic research funds were provided by the academic sector (10 percent) and nonprofit institutions (4 percent).

Since the 1950s, the rationale for the Federal role in supporting basic research in science and engineering has become broadly understood and accepted. Federal support is justified when broad areas of science and engineering research with potential long-term payoff to society as a whole tend to be underfunded by the private sector. Basic research ultimately provides much of the knowledge base required for finding solutions to the Nation's current and future economic and technological challenges. Simultaneously, because the major share is performed in the universities, it serves to train future scientists and engineers, through an apprenticeship system. Thus, the activities supported through NSF make significant, broad-gauge contributions to the Nation's future.

The NSF Role in Research

In FY 1983, the National Science Foundation's basic research obligations of \$998.6 million accounted for 16 percent of the total Federal support of basic research. NSF programs are responsive to the "intellectual marketplace" of ideas that are proposed by scientists and engineers in the Nation's universities, colleges, and other institutions engaged in research. The Foundation's proposal review system is a competitive, national evaluation of these ideas and is designed to select and fund projects of the highest scientific promise and merit. This system allows for the free flow of ideas and basic discoveries and enables the Foundation to adjust its plans and priorities to take advantage of promising, emerging research opportunities.

NSF provides support for the instruments and research facilities that are essential for advances in many science and engineering disciplines. This support ranges from purchases of equipment in individual research projects to the support of major user facilities in physics and materials research, the academic research fleet in oceanography research, five national astronomy centers, and a national atmospheric research center. In addition, NSF conducts the U.S. Antarctic Program, the principal expression of active U.S. interest in Antarctica under the Antarctic Treaty.

NSF programs are particularly important for the academic sector. In FY 1983, NSF provided 24 percent of the total Federal support for basic research to academic institutions. In important branches of several sciences, for example pure mathematics and anthropology, NSF provides over ninety percent of the support for basic research in the universities. In earth and ocean sciences, NSF provides approximately three quarters of such support. In other fields including chemistry and electrical engineering, NSF provides approximately one-third of the support for basic research in universities. These data illustrate the breadth and significance of NSF's responsibilities in university-based research.

A unique feature of NSF support of basic research in universities and colleges is that it ensures that the research function is coupled effectively with the education of future scientists and engineers. As a result of their research involvement, faculties stay at the forefront of scientific and technical knowledge. Graduate and undergraduate students are an integral part of this research process. Later, these students, in turn, put their knowledge to careers in academia, industry or governmental research laboratories.

Graduate students are supported by NSF-funded research projects through research assistantships which result from the congruence of student and faculty research interests and abilities. In this apprenticeship role, students perform a vital function in the conduct of academic research and, most importantly, infuse a vitality and fresh perspective in this research, which is critical to its quality and innovativeness.

NSF also provides support for small science-based and technology-based firms to perform research in high-risk scientific and technical areas. A phased approach to the support of these projects encourages early introduction of private sector funds to replace initial NSF support. NSF support for this program complies with the mandated levels required by P.L. 97-219, the Small Business Innovation Development Act of 1982.

PRIORITIES FOR FY 1985

In formulating program and budget priorities for FY 1985, several important criteria were used. These include: the scientific excellence and promise of the activity; the need to sustain scientific momentum in certain key areas; maintenance of a broad base of support across a wide variety of science and engineering disciplines including provision of advanced equipment and facilities; the potential of an activity to contribute to important national goals; and the need to improve education and training for future scientists and engineers.

STRENGTHENING RESEARCH AND TRAINING

STRENGTHENING THE BASE FOR EXPERIMENTAL SCIENCE AND ENGINEERING

Advances in science and engineering result from a combination of experimental measurement, observation, and theoretical reasoning. Experimental research may range from observations of minute biological structures using electron microscopes to observations of enormous astronomical phenomena using major telescope systems. Experimental research includes laboratory experiments for which investigators control conditions precisely and measure the behavior of well defined systems. It also includes in situ or remote observations of natural systems where constraints are not controllable by the investigators.

New developments in disciplines often follow the emergence of new measurement techniques and at the same time bring more requirements for improvements in instrumentation. The emergence of genetic and molecular techniques in the life sciences is an example. Moreover, instrument technology is transferable among disciplines. The use of nuclear magnetic resonance techniques now ranges from chemistry to solid state physics to biology. Thus, the need for improved instruments and facilities is common to almost all disciplines. More sensitive, more accurate, more precise, and more rapid measurement systems and an adequate supply of trained users are the keys to posing and answering new research questions.

The National Science Foundation meets the needs of experimental research in three major ways:

- o Through the provision of instrumentation to individual projects and investigators in grants for Scientific Research Project Support (SRPS);
- o Through the support of university-based centers and facilities such as the Materials Research Laboratories, which permit coordinated multi-disciplinary thrusts and require a diversity of scientific and engineering competence; and
- o Through the funding of national centers, such as those for the Astronomical Sciences, that provide major facilities that serve hundreds of scientists across the Nation.

In FY 1984 and FY 1985, the Foundation has given high priority to research equipment and instrumentation. The FY 1984 total for equipment and instrumentation includes \$15 million appropriated by Congress specifically for high technology instrumentation. The following table shows that NSF support of research facilities, equipment and instrumentation increases by 96.5 percent between FY 1983 and FY 1985 and by 20.3 percent between FY 1984 and FY 1985.

R&D FACILITIES, EQUIPMENT AND INSTRUMENTATION
(Obligations in Millions of Dollars)

	Actual FY 1983	Estimate FY 1984	Estimate FY 1985	Increase (Percent)	
				FY 85/83	FY 85/84
Mathematical and Physical Sciences	\$59.8	\$82.2	\$99.0	66.1%	20.4%
Engineering	8.7	18.2	24.0	175.9	31.9
Biological, Behavioral, and Social Sciences	16.5	24.6	28.4	72.1	15.4
Astronomical, Atmospheric, Earth and Ocean Sciences	25.1	49.4	59.1	135.5	19.6
U.S. Antarctic Program	8.7	20.2	23.9	174.9	18.3
Scientific, Technological and International Affairs	2.0	2.4	2.6	25.0	8.3
TOTAL, NSF	\$120.6	\$197.0	\$297.0	96.5%	20.3%

Of the \$237.0 million estimated for FY 1985, \$122.0 million will support research instrumentation for individual projects. The remainder will support instrumentation and facilities at multi-user centers at universities and at national centers. University-based centers and facilities include for example the Materials Research Laboratories and the National Magnet Laboratory; physics facilities such as the Cornell Electron Storage Ring (CESR); Coordinated Experimental Research facilities for computer research; Industry/University Cooperative Research Centers; university-based telescope

systems, and centers for research in engineering. National centers and facilities include the astronomical observatories, the National Center for Atmospheric Research (NCAR), and the oceanographic research facilities and the ocean drilling program.

In addition to maintaining this existing base of equipment and facilities for experimental science and engineering, the FY 1985 Budget Request includes several major additional capabilities in selected disciplines. Significant increases in the FY 1985 Budget Request are aimed at improving the quality of research in engineering. This effort will involve the development of university centers for cross-disciplinary research in engineering which will allow teams of researchers to tackle long term, high risk research problems of importance to industry and to train simultaneously graduate and undergraduate students in modern engineering practice.

Construction of the Very Long Baseline Array (VLBA) radio telescope will begin in FY 1985. This will constitute one of the great advances in terms of astronomical capability. It is being designed to surpass all existing or planned telescopes in resolution, sensitivity, speed, image quality, polarization capability, and frequency coverage. It will, for example, give images of cosmic radio sources showing details smaller than a thousandth of an arc second. This resolution represents an improvement by a factor of 100 to 1000 over conventional radio and optical telescopes.

The VLBA will be built by the National Radio Astronomy Observatory (NRAO) in cooperation with university laboratories. The Array will contain individual antenna elements at fixed sites located throughout the United States ranging from Hawaii to Puerto Rico. It will operate as a single instrument, with each antenna directly controlled from a main Operation Center via dedicated telephone lines. Although it will be a unique scientific instrument, the VLBA is based largely on devices and techniques already developed for the highly successful Very Large Array (VLA) in New Mexico and for the limited use of the VLA coupled to other radio telescope facilities in the U.S.

Advances in research in the atmospheric sciences and ocean sciences depend in large part on the availability of major computer systems provided by NCAR. The FY 1985 Budget Request contains initial support for the acquisition of an Advanced Vector Computer (AVC) at NCAR. This represents a major step in the planned upgrading of the computer facilities at NCAR. The AVC system will provide at least five times the speed and ten times greater memory than the current NCAR system. The related activities in advanced scientific computing are discussed later in the section "SCIENTIFIC COMPUTING RESOURCES."

Improvements in the instruments and facilities available to scientists and engineers frequently create significant additional demands for increases in operating budgets. The FY 1985 Budget Request builds upon the Foundation's current activities to provide adequate project support to individual scientists and engineers so as to maximize the benefits attainable from improved experimental capability.

The table below illustrates the increased support that the Foundation is providing to meet the needs of experimental science and engineering through

university-based facilities and centers, national facilities and centers and research instrumentation in projects.

CENTERS AND INSTRUMENTATION FOR EXPERIMENTAL SCIENCE AND ENGINEERING
(Millions of Dollars)

	Actual FY 1983	Current Plan FY1984	Estimate FY 1985	Difference FY 1985/84
University Based Facilities and Centers				
Physics	\$ 38.5	\$ 45.0	\$ 52.0	\$ 7.0
Materials	30.9	36.9	42.2	5.3
Engineering	2.0	2.7	13.4	10.7
Centers for Cross-Disciplinary Research In Engineering	—	—	(10.0)	(10.0)
Computer Research Facilities	11.0	14.0	16.7	2.7
University Observatories	5.0	5.3	6.0	0.7
Regional Instrumentation Facilities	2.9	4.1	4.7	0.6
Subtotal	90.3	108.0	135.0	27.0
National Centers and Facilities				
Astronomy Centers	41.2	50.5	64.5	14.0
NCAR	32.4	40.0	45.9	5.9
Upper Atmospheric Facilities	3.5	3.8	4.1	0.3
Oceanographic Facilities	31.6	32.8	36.4	3.6
Ocean Drilling Program	21.0	26.3	27.6	1.3
Subtotal	129.7	153.4	178.5	25.1
Project Research Instrumentation				
.....	70.0	104.0	122.0	18.0
Total	\$290.0	\$365.4	\$ 435.5	\$ 70.1

SCIENCE AND ENGINEERING TRAINING AND EDUCATION

The National Science Foundation is strongly committed to enhancing U.S. science and engineering education and training at all academic levels. While the Foundation's support represents only a small fraction of the total national funding for science and engineering education, it is designed to gain maximum leverage and serve as a catalyst for achieving improvements.

It is vitally important that the Nation continue a strong investment in the maintenance of a high quality base of scientific and engineering personnel. Such an investment will be a significant factor in:

- o Stimulating and improving the Nation's economic growth and productivity;
- o Providing a well-trained human resource pool essential to the achievement of future technological breakthroughs of benefit to society;
- o Maintaining U.S. leadership in science and technology and improving its competitive position in international trade; and

- o Strengthening U.S. national security.

The Foundation's FY 1985 Budget Request continues to be highly responsive to needs in science and engineering education and in training young scientists and engineers. Responsibilities for these activities cut across the Science and Engineering Education activity and the research activities.

At the Precollege Level:

Support totals \$54.7 million in FY 1985. The proposed program reflects input from a variety of sources, including the report of the National Science Board Commission on Precollege Education in Mathematics, Science and Technology, and the Department of Education report, "A Nation at Risk."

The FY 1985 program is designed to assist in providing the highest quality precollege science and mathematics education activities for America's youth. These activities will enable scientists and educators to develop new or improved instructional materials for students and teachers; will provide for research and development on the application of advanced technologies, particularly the computer, to the teaching and learning of science and mathematics; will support local and regional programs of continuing education and professional development for teachers; and will provide for annual recognition of outstanding secondary school teachers through Presidential Awards for Excellence in Science and Mathematics Teaching.

The program will support informal science education activities to improve understanding and awareness of science using a variety of media, including radio, television, and museums. Activities designed to publicize and disseminate information about highly successful programs and outstanding research in science and engineering education will be supported.

Program funds will also provide for studies and analyses of existing data bases to provide a systematic and continual understanding of the condition of precollege science and mathematics education in the U.S.

At the Undergraduate Level:

Support for research at predominantly undergraduate institutions is increased from \$36.8 million in FY 1984 to \$42.4 million or by 15.2 percent. This support will provide for a stronger coupling between research and education in the Nation's predominantly undergraduate institutions (institutions awarding an average of 20 or fewer Ph.D's in the sciences over the past two years.) It will provide greater opportunities for faculty and students at these institutions to gain hands-on experience with the latest scientific instrumentation and research techniques. This emphasis is important since many of the Nation's leading scientists and engineers receive their basic training at predominantly undergraduate institutions. Additionally, research awards to other institutions provide opportunities for undergraduate research participation and training. The new centers for cross-disciplinary research in engineering in particular will provide opportunities for training undergraduate students.

At the Graduate Level:

Support for graduate students on research awards increases from \$89.5 million in FY 1984 to \$103.4 million in FY 1985 or by 15.5 percent. This will provide for an increase of 1,050 in the number of graduate students supported to a total of 11,614. These graduate research assistants, and some undergraduates, are selected by faculty principal investigators and carry out significant research tasks while at the same time gaining valuable learning experiences that help prepare them for future careers in science or engineering. The new centers for cross-disciplinary research in engineering in particular will help train students to understand modern engineering practice.

SUPPORT OF GRADUATE STUDENTS ON RESEARCH PROJECTS
(Numbers and Obligations in Millions of Dollars)

	Number Supported				Amount of Support			
	Actual FY 1983	Estimate FY 1984	Estimate FY 1985	% Diff. FY 85/84	Actual FY 1983	Estimate FY 1984	Estimate FY 1985	% Diff. FY 85/84
Research & Related Activities:								
Mathematical and								
Physical Sciences ...	4,232	4,489	4,985	11.0%	\$31.6	\$36.1	\$42.1	16.6%
Engineering	1,785	2,155	2,512	16.6	17.6	22.3	27.1	21.5
Biological, Behavioral and Social Sciences ..	1,779	1,888	1,982	5.0	11.1	12.6	14.2	12.7
Astronomical,								
Atmospheric, Earth & Ocean Sciences ...	1,615	1,632	1,722	5.5	13.4	15.6	17.0	9.0
U.S. Antarctic Program	103	117	126	7.7	.7	.8	.8	.0
Scientific, Technological, & International								
Affairs	292	253	257	1.5	2.0	2.0	2.1	.0
Special Foreign								
Currency	31	30	30	.0	.1	.1	.1	.0
TOTAL, NSF ...	9,837	10,564	11,614	9.9%	\$76.5	\$89.5	\$103.4	15.5%

NSF support for Graduate Fellowships increases from \$20.3 million in FY 1984 to \$21.0 million in FY 1985 or by 3.4 percent. The recipients of NSF graduate fellowships are highly-talented U.S. citizens who are selected through a national competition on the basis of merit. In FY 1985 the Foundation will make 550 new fellowship awards, bringing the total number of graduate fellows supported to approximately 1,550. The stipend will increase from \$8,100 to \$9,000 per year. The cost-of-education allowance remains at \$4,900.

At the Postdoctoral Level:

Support for postdoctoral researchers increases from \$51.7 million in FY 1984 to \$57.7 million in FY 1985 or by 11.6 percent. The number of postdoctorals supported increases from about 3,300 to 3,500 or by 6.0 percent.

SUPPORT OF POSTDOCTORALS ON RESEARCH PROJECTS
(Numbers and Obligations in Millions of Dollars)

	Number Supported				Amount of Support			
	Actual FY 1983	Estimate FY 1984	Estimate FY 1985	% Diff. FY 85/84	Actual FY 1983	Estimate FY 1984	Estimate FY 1985	% Diff. FY 85/84
Research & Related Activities:								
Mathematical and Physical Sciences ...	1,468	1,560	1,640	5.1%	\$23.0	\$27.7	\$30.9	11.6%
Engineering	153	175	194	10.9	1.7	2.1	2.4	14.3
Biological, Behavioral and Social Sciences ..	907	957	1,012	5.7	11.1	12.6	14.1	11.9
Astronomical, Atmospheric, Earth & Ocean Sciences ...	442	467	498	6.6	6.6	7.6	8.3	9.2
Scientific, Technological, & International Affairs	130	137	142	3.6	1.4	1.5	1.7	13.3
U.S. Antarctic Program	18	20	21	5.0	.2	.2	.3	50.0
TOTAL NSF ...	3,118	3,316	3,507	5.8%	\$44.0	\$51.7	\$ 57.7	11.6%

Presidential Young Investigators.

The Presidential Young Investigator Research Awards, initiated in FY 1984, provide research support for the Nation's most promising young science and engineering faculty members. With matching funds and participation from the industrial sector, the awards are intended to encourage promising young investigators to remain in academic careers so as to ensure the excellence of engineering education, training, and research.

In FY 1985, NSF will support 400 Presidential Young Investigators (200 new awards and 200 ongoing awards initiated in FY 1984) at a level of \$23.8 million, approximately a doubling in support from the FY 1984 level. About half of these awards will be made to engineering faculty, where there is an identified need to retain and attract highly qualified individuals.

Centers for Cross-Disciplinary Research in Engineering

The traditional mode of support for engineering research and training at the National Science Foundation (NSF) has been through research grants to individual engineers mainly at colleges and universities. These grant activities have been and will continue to be the main element in the Foundation's Engineering Research Directorate. However, there is a clear need, documented in various studies and reports, to extend the Foundation's engineering research and training activities to include modes of support that would better facilitate cross-disciplinary engineering research--particularly in research areas which relate closely to the understanding and design of engineering systems and to the use of new technologies that are altering the ways in which engineering research and training are conducted. Thus, as part of its mission to ensure the health of U.S. science and engineering research and education, NSF is requesting \$10 million in FY 1985 to support centers for cross-disciplinary research in engineering. This research will concern subjects such as computer integrated manufacturing systems, voice and data communication systems, and biotechnology processing systems. The centers will integrate research with the teaching of engineering practice to undergraduate and graduate students, and will provide for close interactions with industry.

SCIENTIFIC COMPUTING RESOURCES

Computers have been used in scientific and engineering research for a relatively brief period -- about 30 years or so -- but this use has dramatically changed the way in which much research is now conducted.

Today, fully configured, dedicated supercomputer systems exist at a small number of government laboratories and university research centers. Many of these systems are saturated and, even collectively serve only a limited portion of the nation's research community. Just two centers, the National Magnetic Fusion Energy Computer Center, supported by the Department of Energy, and the National Center for Atmospheric Research, supported by NSF, have served, in recent years, a substantial number of remote academic researchers in fusion research and atmospheric and oceanographic research.

There are some research areas where advances are now completely dependent on access to the most advanced scientific computational resources. For example, recent major advances in the atmospheric sciences have been essentially dependent on such computational resources. In FY 1985, NSF will start the acquisition of the Advanced Vector Computer (AVC) for the National Center for Atmospheric Research (NCAR). This machine will upgrade the present saturated system and allow new classes of problems to be tackled such as the effects of ocean atmosphere coupling on climate. Other fields requiring advanced computer facilities but lacking broad access to them include surface and plasma physics, computational chemistry, VLSI and circuit design, fluid dynamics, computational mathematics, astrophysics, information sciences, the social sciences, and biophysics. Access to advanced computational resources is needed not only for the conduct of research, but for the training of sophisticated computational scientists and engineers essential for the future academic, industrial, and defense requirements of the Nation.

Recent studies and workshops have documented the growing opportunities and unfilled needs in advanced scientific computing. Among those which have made specific recommendations are the interagency December 1982 Report of the Panel on Large-Scale Computing in Science and Engineering, the July 1983 NSF Report A National Computing Environment for Academic Research, and the August 1983 Report to the Federal Coordinating Council for Science, Engineering, and Technology Supercomputer Panel. These reports detail needs for computing resources of all types, from the lack of adequate local computing resources required as part of the daily working environment of academic researchers and graduate students, to a critical need to make the most advanced computing resources available to selected researchers from the academic community. Resources are also needed for development of networks and support for academic research on computer architectures, computational mathematics, algorithms, and software for parallel computers.

As part of the National Science Foundation responsibility for support across the broad range of academic-based scientific and engineering research activities, a modest effort (about \$6.0 million) was initiated in FY 1984 to provide access to advanced computational resources. The FY 1985 plan extends and expands the activities begun in FY 1984 reaching a level of approximately \$20.0 million. This amount will be used to provide access to advanced computers, for appropriate networking capability and to support such local user needs as equipment, software, communications costs, remote workstations, local area networks, technical support, and maintenance.

Other aspects of NSF supported research on advanced computers are research in architecture design and software applications specifically related to the development of supercomputers. This support, approximately \$8 million in FY 1984, is provided through the Division of Computer Research of MPS, the Computer Engineering Program of the Division of Electrical, Computer and Systems Engineering of ENG, the Division of Information Science and Technology of BBS, and the Division of Mathematical Sciences of MPS. The Foundation anticipates that this support will increase by \$2 million to approximately \$10 million in FY 1985.

SCIENCE IN THE INTERNATIONAL SETTING

The need for and benefits from international cooperation in science and technology are accepted by most nations of the world. The costs of facilities, instrumentation, and research-related expenditures necessitate cost-sharing and access to shared facilities. Many phenomena of interest cross national boundaries involving, for example, large scale motions of oceans and the atmosphere and the large scale geological structure of the earth. Historically, international scientific communication and cooperation have played major roles in the advance of national efforts in research and training.

As part of the new NSF management plan, introduced in FY 1984, the involvement of the disciplinary research directorates in all aspects of programs with an international dimension has been assured. Furthermore, in order to strengthen the international cooperative science programs technically, a new steering committee has been formed in which all directorates participate in decisions affecting bilateral programs.

The NSF has a well-defined strategy to achieve the goal of advancing the Nation's scientific and engineering research effort through international cooperation. In addition to serving the foreign policy objectives of the U.S., international cooperative research activities provide U.S. scientists and engineers access to: facilities available in other countries but unmatched in the United States; unique geographical settings and phenomena; novel research techniques or approaches; informal scientific communication which can aid or profoundly affect a line of research; and the experience of cooperating with leading foreign scientists and engineers.

The international effort of NSF has several elements: travel grants, support for research that is carried out abroad, cooperative international research and bilateral and multilateral agreements providing a formal mechanism under which cooperative research in designated categories may be carried out. The larger part of this activity is the support by the research directorates of projects and programs that are intrinsically international because of subject matter, unique facilities, or locale. These range from project research conducted abroad, often involving informal cooperation with foreign scientists, to major programs in specific disciplines, such as scientific ocean drilling to which several nations contribute. Activities under more formal bilateral and multilateral agreements are also supported jointly by the Scientific Technological and International Affairs Activity (STIA) and the disciplinary research directorates. In addition, a contract with the National Academy of Sciences (NAS) supports U.S. participation in many scientific efforts of the International Council of Scientific Unions (ICSU). The international scientific community maintains a tradition of international cooperation through visits to colleagues, attendance at conferences, via exchanges of literature, and professional affiliation through federations of national scientific societies primarily affiliated with the Unions making up ICSU. The NAS serves as the U.S. affiliate to the individual Unions and ICSU, with NSF providing resources including payment of the various dues.

The following table shows NSF support for international activities in terms of cooperative research carried out under formal bilateral or multilateral agreements; research projects that are intrinsically international; and special activities, including support for international institutions, that are sufficiently large to be identified individually.

NSF SUPPORT OF INTERNATIONAL SCIENCE ACTIVITIES
(Millions of Dollars)

	Actual FY 1983	Current Plan FY 1984	Estimate FY 1985	Difference FY 1985/84
Cooperative Research				
STIA	\$ 3.6	\$ 3.9	\$ 3.9	\$ —
Disciplinary Activities	5.3	5.9	6.8	0.9
International Related Research Projects				
Disciplinary Activities	17.6	20.2	23.2	3.0
Special Activities				
Antarctic Research	18.9	22.3	22.8	0.5
Ocean Drilling	21.0	26.3	27.6	1.3
International Science Organizations	1.0	1.1	1.1	—
Indo-U.S. Initiative	—	2.0	2.0	—
Special Foreign Currency	3.1	2.9	2.8	-0.1
Total	\$ 70.5	\$ 84.6	\$ 90.2	\$ 5.6

HIGHLIGHTS OF THE FY 1985 REQUESTMATHEMATICAL AND PHYSICAL SCIENCES (MPS)

The FY 1985 Budget Request for MPS is \$416.7 million. This represents an increase of \$57.9 million, or 16.1 percent, over the FY 1984 Current Plan. This increase will improve all aspects of NSF support for research in these disciplines. Mathematical Sciences increases by \$9.0 million to \$50.5 million. Computer Research increases by \$ 5.5 million to \$39.35 million. Physics increases by \$15.9 million to \$121.8 million. Chemistry increases by \$12.1 million to \$92.1 million. Materials Research increases by \$15.5 million to \$113.0 million. These increases in the subactivities affect the major components of all programs as follows:

Research Projects -- Scientific Research Project Support (SRPS) is increased \$30.7 million, or 13.1 percent, to a total of \$265.3 million. Included in that amount is instrumentation totaling \$31.4 million.

- o In the mathematical sciences, continued substantial improvement is made in the support of graduate and postdoctoral students, including the Mathematical Sciences Postdoctoral Fellowship Program. Increased support is also provided for research activities in computational mathematics and statistics and for access to appropriate computational facilities.
- o Research project support in computer research is strengthened to respond to new research opportunities generated by the establishment of the Coordinated Experimental Research program. Increased participation by graduate students is stressed throughout.
- o The efforts to revitalize university physics research are continued by providing new research instrumentation and improved computing capabilities to active research groups and increasing support for postdoctoral scientists and graduate research assistants. An important major focus continues to be the provision of new incentives and research opportunities for young researchers.
- o The Nation's academic research effort in chemistry is further strengthened by providing new and expanded research opportunities in areas presenting significant promise for rapid advancement, with special emphasis on the chemistry of life processes as recommended by the Committee to Survey the Chemical Sciences of the National Academy of Sciences. Increased support is targeted on the most creative established investigators and on young investigators.

- o Major emphasis in materials research is on strengthening the training of future materials scientists and engineers, particularly in technologically important areas such as electronic materials, ceramics, and polymers. Enhanced support is provided for instrumentation, associated technical support, and necessary materials and supplies. The number of multi-investigator -- multi-disciplinary projects supported is increased, particularly in the basic engineering areas of materials research.

Special Equipment Programs -- Most subactivities provide support through formal or informal programs for the acquisition of research instrumentation and equipment for group or departmental use. Support for special equipment is increased by \$3.9 million, or 19.1 percent, to a total of \$24.3 million.

University Laboratories--Support for research, operations, and instrumentation at university laboratories in computer research, physics, and materials research is increased by \$10.1 million, or 18.5 percent, to a total of \$64.8 million. Included are the experimental computer research facilities, a number of nuclear physics laboratories, and the Materials Research Laboratories.

National User Facilities -- Support for national user facilities is increased by \$5.8 million, or 12.6 percent, to a total of \$52.0 million. Included are the Mathematical Sciences and Theoretical Physics Institutes, the Cornell Electron Storage Ring, the Michigan State University Superconducting Cyclotron, Synchrotron Radiation facilities, and the National Magnet Laboratory.

Advanced Scientific Computing -- MPS support for the Foundation-wide initiative on advanced scientific computing is increased by \$7.3 million to a total of \$10.3 million. This support contributes to the establishment of university supercomputer facilities, associated networks, and local facilities.

ENGINEERING (ENG)

The FY 1985 Budget Request for this activity is \$147.1 million. This represents an increase of \$26.4 million, or 22 percent over the FY 1984 Current Plan of \$120.7 million. Within this amount:

- o Electrical, Computer, and Systems Engineering is increased by \$8.7 million from \$36.0 million to \$44.7 million with added emphasis in microstructure fabrication research, integrated optical devices, automated design, microensors, and robotics to aid the handicapped, and optimization methods for production scheduling in industrial processes.
- o Chemical and Process Engineering is increased by \$5.9 million from \$26.6 million to \$32.5 million which provides for efforts in biotechnology, novel processing techniques, catalytic reaction engineering, microcontamination control, and plasma-chemical processing.

- o Civil and Environmental Engineering is increased by \$6.0 million from \$33.8 million to \$39.8 million with special support in coastal and ocean engineering, problems of repair, retrofit, and rehabilitation of parts of the public infrastructure, and upgrading and modernization of experimental facilities used in earthquake engineering.
- o Mechanical Engineering is increased by \$5.7 million from \$24.4 million to \$30.1 million with added emphasis in thermal systems, tribology, biomechanics and robotics/automated manufacturing.
- o Advanced Scientific Computing increased by \$3.5 million from \$1.5 million to \$5 million and reflects engineering efforts devoted to the Foundation-wide initiative which began in FY 1984 to provide access to advanced computer facilities for researchers from all disciplines.
- o Centers for Cross-Disciplinary Research in Engineering is a \$10 million initiative designed to support the development of centers, which will perform cross-disciplinary research on problems of importance to industry while simultaneously educating graduate and undergraduate students in engineering practice.

ASTRONOMICAL, ATMOSPHERIC, EARTH, AND OCEAN SCIENCES (AAEO)

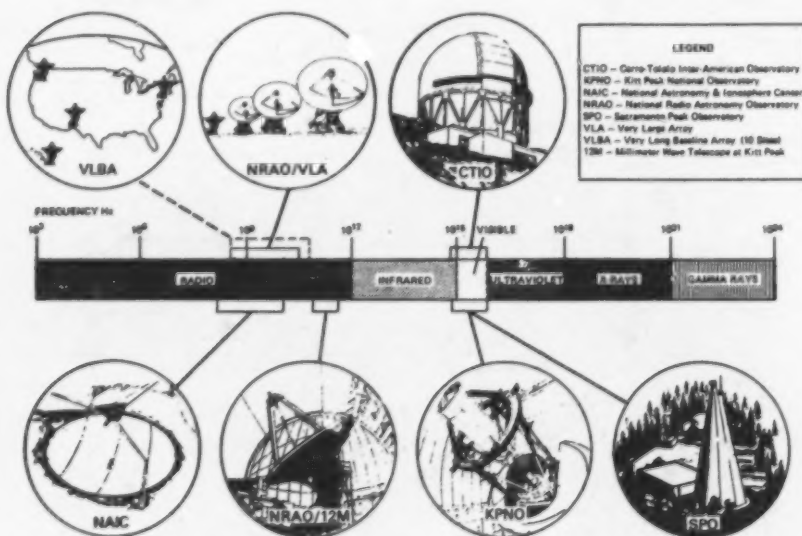
The FY 1985 Budget Request is for \$373.5 million, an increase of \$43.5 million or 13.2 percent over the FY 1984 Current Plan of \$330.0 million. The increase is applied as follows:

- o Astronomy is increased \$15.2 million from \$78.2 million to \$93.4 million. This increase allows the subactivity to carry out the most important recommendations of the report of the Astronomy Survey Committee of the National Academy of Sciences. This includes the first-phase of a "major new program," the acquisition of the Very Long Baseline Array (VLBA) that requires most of the increase.
- o Atmospheric Sciences is increased \$9.2 million from \$89.3 million to \$98.5 million. This increase provides for the first-phase acquisition of the Advanced Vector Computer (AVC) to be based at the National Center for Atmospheric Research and allows for continued payments towards the mass storage system. Project support increases in all subdisciplines, particularly in atmospheric chemistry. The Global Atmospheric Research Program, now well into the analysis of data analysis, continues to phase down.
- o Earth Sciences is increased \$7.1 million from \$41.5 million to \$48.6 million, which allows for major upgrading of instrumentation and a major research thrust on the chemistry, structure, and geologic history of the

continental lithosphere as recommended by the National Academy of Sciences report, "Opportunities for Research in the Geological Sciences, 1983." The latter will include continued continental reflection profiling (COCORP) operations, and preliminary site surveys prerequisite to deep continental drilling.

- o Ocean Sciences is increased \$11.2 million from \$113.7 million to \$124.9 million with emphasis on studies of the ocean floor. Increased equipment support is provided through project grants. Maintenance and upgrading of shipboard scientific equipment is also a priority. The Ocean Drilling Program now included here, will commence the first year of an international drilling program using a large, modern drillship.
- o Arctic Research is increased \$0.6 million from \$7.4 million to \$8.0 million. Increases are provided particularly for atmospheric, biological, and earth sciences research.
- o Advanced Scientific Computing, which is separate from but coordinated with the NCAR Advanced Vector Computer acquisition, will provide increased access to advanced computers as well as local facilities to take advantage of the contributions that advanced computer use can make to the AAEO disciplines. In FY 1985, \$2.4 million is provided for this initiative.

SPECTRUM COVERAGE OF TELESCOPES AT NATIONAL ASTRONOMY CENTERS

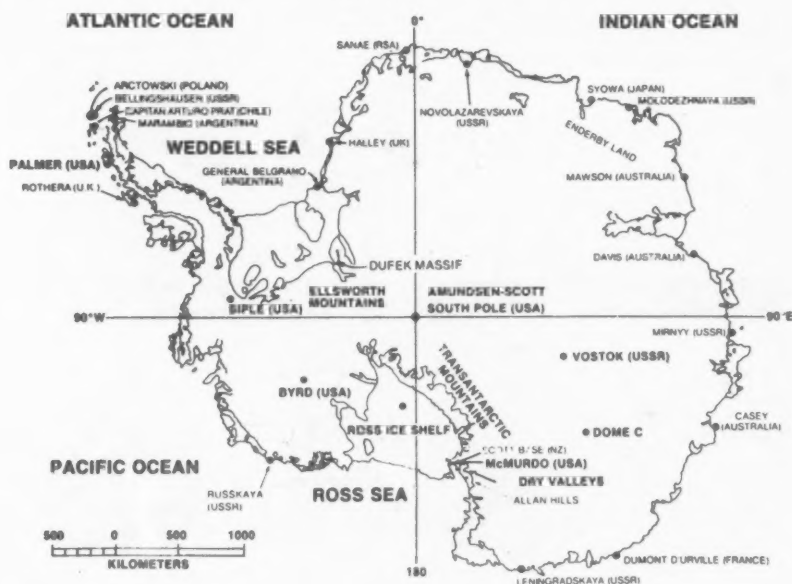


U.S. ANTARCTIC PROGRAM (USAP)

The FY 1985 Budget Request is a 12.3 percent increase over the FY 1984 Current Plan. The increase of \$12.6 million from \$102.5 million to \$115.1 million is required for expenses in the following categories:

- o An amount of \$6.0 million is included for the first time to reimburse the Department of Defense (DOD) for military retirement costs. There will be a corresponding decrease in the DOD FY 1985 budget request for military retirement costs, therefore, this adjustment does not result in an increase in the total Federal budget.
- o There is a \$0.8 million increase in the U.S. Antarctic Research Program to a total of \$11.0 million, which will provide for an increase in the number of research awards and new initiatives in glaciology and oceanography.
- o The remainder of the increase, \$5.8 million, will be used by the Operations Support Program to offset across-the-board price increases and continue the equipment procurement and facilities upgrading and maintenance that has been deferred in prior years.

ANTARCTICA: selected stations and physical features.



BIOLOGICAL, BEHAVIORAL, AND SOCIAL SCIENCES (BBS)

The FY 1985 Budget Request of \$253.1 million is an increase of \$28.4 million or 12.7 percent above the FY 1984 Current Plan. Within this amount:

- o Physiology, Cellular, and Molecular Biology is increased \$14.3 million, from \$102.1 million to \$116.4 million. The increase will allow a continued emphasis in the plant sciences to advance the understanding of plants through application of both contemporary molecular and cellular approaches and instrumentation technologies. Additional emphasis will be placed on research using genetic methods to examine fundamental biological questions and on the chemistry of biological processes. Continued attention will be paid to providing funds for research instrumentation and research resources.
- o Biotic Systems and Resources is increased by \$6.5 million from \$53.4 million to \$59.9 million. The increase will allow a continued emphasis in the plant sciences, including research on the role of plant toxins in controlling damage by insects, and on plant adaptation to nutrient limitations. Emphasis will be placed on augmenting awards to permit use of instrumentation and materials essential for the application of molecular genetic techniques to studies of systematics and population biology. The program to refurbish marine biology laboratories will be continued.
- o Behavioral and Neural Sciences is increased \$3.8 million from \$38.5 million to \$42.3 million. In the neurosciences a \$3.0 million increase will be used primarily for instrumentation and increasing award sizes for the most promising projects. The \$0.8 million increase in cognitive science and anthropology will permit increased attention to such important research areas as human origins, the learning process, and studies on the development of cognitive capacities, including language.
- o Social and Economic Science is increased \$3.4 million from \$24.6 million to \$28.0 million. The increase provides for the extension of key socioeconomic data resources and a strengthening of related methodological and theoretical research.
- o Information Science and Technology is increased \$0.5 million from \$6.1 million to \$6.6 million. The additional funds will allow continued support for research in selected areas of information technology and information impact which will generate fundamental knowledge bearing directly on current advances in electronic and computing machinery.
- o Advanced Scientific Computing will be increased to \$2.4 million to provide for communications links and network facilities for user access to these resources as well as support for local user costs, such as software, technical support, and auxiliary equipment. The Foundation-wide initiative builds upon activities begun in FY 1984.

SCIENTIFIC, TECHNOLOGICAL, AND INTERNATIONAL AFFAIRS (STIA)

The Scientific, Technological, and International Affairs (STIA) activity carries out essential Foundation responsibilities that cut across scientific disciplines and provide unique services to the scientific and engineering community. Because STIA provides the Foundation with a broad window to the diverse elements of the U.S. scientific and engineering enterprise, it advances the Foundation's leadership role with regard to the improved functioning of that enterprise, provides better understanding of the use of science and technology by different sectors of society, and enhances the returns from the national investment in research. The FY 1985 Budget Request of \$46.9 million is an increase of \$6.1 million or 14.9 percent above the FY 1984 Current Plan of \$40.8 million. The increases are applied as follows:

- o Industrial Science and Technological Innovation (ISII) increases from \$17.6 million to \$23.4 million. The entire increase of \$5.8 million is applicable to the NSF Small Business Innovation Research (SBIR) program and complies with the mandated percentage required by P.L. 97-219, the Small Business Innovation Development Act of 1982. It will provide for: continuation funding of about 30 Phase II awards started in FY 1984; increase in the size of an estimated 110 Phase I awards from \$35,000 to \$40,000; and award of approximately 40 new Phase II projects in FY 1985. There are no changes in other ISTI programs involving industry/university cooperative research projects, research centers, and productivity improvement research.
- o International Cooperative Scientific Activities remains at the FY 1984 level of \$5.5 million. This amount will provide support for U.S. participation in seminars, workshops, and short-term scientific visits abroad. An estimated 900 U.S. scientists and engineers will participate in these international activities. An additional \$6.8 million for support of international cooperative research projects and \$1.5 million for the Indo-U.S. Science and Technology Initiative have been earmarked in other NSF budget activities. The international subactivity continues to coordinate and manage bilateral cooperative agreements and the Indo-U.S. Science and Technology Initiative. Special emphasis will also be given during FY 1985 to maintenance of programs with China, Eastern Europe, Western Europe, Sub-Saharan Africa, and Latin America, as well as continuation of U.S. participation in international scientific organizations.
- o Policy Research and Analysis increases by \$100,000 for a total of \$4.7 million in FY 1985. The increase is focused in the Technology and Resource Policy program element to expand studies and research on the impact of telecommunications, computers, and information networks on Federal policies dealing with science, technology, and natural resources.
- o Science Resources Studies increases by \$100,000 for a total of \$4.3 million in FY 1985. The FY 1985 program maintains the science resources

data base through continuation of the periodic survey program at approximately its current level of effort. The additional funds will permit the expansion of regular surveys of industrial firms to generate systematic data on U.S. innovative activities, such as the number of new products introduced each year. This effort will build on feasibility studies carried out in FY 1982 and 1983. Support for a survey of recent and senior science and engineering faculty is also included.

- o Research Initiation and Improvement increases by \$77,670 for a total of \$9.0 million in FY 1985. The increase will permit the initiation of a new program, Research Opportunities for Women, at a level of \$0.5 million. Program elements to be funded entirely by discipline-oriented research activities will increase by a net amount of \$15.0 million over the \$53.2 million level provided in FY 1984. Increases will go to: Presidential Young Investigators Research Awards--\$11.9 million (from \$11.9 million to \$23.8 million); Support for Predominantly Undergraduate Institutions--\$5.6 million (from \$36.8 million to \$42.4 million.) The Experimental Program to Stimulate Competitive Research, supported at \$2.5 million in FY 1984, is discontinued in FY 1985 consistent with its original plans and objectives. NSF Planning and Evaluation remains constant in FY 1985 at \$2.0 million.

The disciplinary research activities have earmarked a total of \$80.7 million for programs to be coordinated by STIA as shown below.

**PROGRAMS COORDINATED BY STIA THAT RECEIVE PARTIAL OR TOTAL FUNDING
WITHIN THE DISCIPLINE-ORIENTED RESEARCH ACTIVITIES IN FY 1985**
(Millions of Dollars)

Program	STIA	Funding Within Research Activities	Total
International Cooperative Research Activities	\$ 5.0	\$ 6.8	\$11.8
Indo-U.S. Science and Technology Initiative	\$ 0.5	\$ 1.5	\$ 2.0
Industry/University Cooperative Research Programs	\$ 7.0	\$ 7.0	\$14.0
Presidential Young Investigators Research Awards ..	\$ —0—	\$23.8	\$23.8
Support for Predominately Undergraduate Institutions	\$ 2.8	\$39.6	\$42.4
NSF Planning and Evaluation	\$ —0—	\$ 2.0	\$ 2.0
Total	\$15.3	\$80.7	\$96.0

SCIENCE AND ENGINEERING EDUCATION (SEE)

The FY 1985 Budget Request for SEE is \$75.7 million, an increase of \$0.7 million from the FY 1984 New Obligation Authority of \$75.0 million. The FY 1985 support will be distributed as follows:

- o Graduate Research Fellowships (\$21.0 million). This represents an increase of \$0.7 million or 3.4 percent above the FY 1984 total of \$20.3 million and will support 550 new fellowships for an overall total of approximately 1,550 fellowship offers. The annual stipend for graduate fellows increases from \$8,100 to \$9,000 and the annual cost-of-education allowance will be \$4,900, the same as in FY 1984.
- o Precollege Science and Mathematics Education (\$54.7 million). This amount is the same as the FY 1984 New Obligation Authority and will provide support for teacher development and incentives, new instructional materials, special studies to gain a better understanding of precollege science education in the U.S., research in teaching and learning, informal science education, and activities to publicize and disseminate information about highly successful programs and outstanding research efforts. The requested FY 1985 level is approximately double the FY 1980 level for this subactivity.

PROGRAM DEVELOPMENT AND MANAGEMENT (PD&M)

The Program Development and Management Activity provides resources for the effective management of NSF.

The FY 1985 Budget Request for the PD&M activity is \$77.9 million, which represents an increase of \$4.3 million or 6.5 percent from the FY 1984 Current Plan of \$66.6 million. The number of full-time equivalent employment is 1,194, the same level as the FY 1984 Current Plan.

Within the amount for FY 1985:

- o Personnel compensation and benefits will be funded at \$51.2 million, an increase of \$.91 million or 1.8 percent above the FY 1984 Current Plan level. The additional amount will annualize the costs of the pay increase effective January 1984.
- o Travel of staff, proposal reviewers, panelist and advisors is increased by \$.48 million or 16 percent. The increase will offset some of the rise in fare costs since the Foundation's overall travel limitation was last raised two years ago and provide limited real growth in the amount of travel which can be performed for staff site visits and program administration.

- o Funding for planned data processing equipment purchases is increased by \$1.05 million which will permit enhancement of the Foundation's data processing capability consistent with the established long-range plan.
- o All other PD&M costs items will be increased by a total of \$1.9 million, or 14.8 percent and will fund required office space alterations, assessed communications equipment purchase charges by the General Services Administration, cost increases for employee training, contract software development, increased usage of supplies and other contractual services required for the day-to-day operations of the Foundation.

**BUDGET SUMMARY OF OBLIGATIONS BY ACTIVITY AND
SUBACTIVITY SHOWING DOLLAR PERCENTAGE CHANGES,
FY 1985/FY 1984**

(Millions of Dollars)

Activity & Subactivity	Actual FY 1993	Current Plan FY 1994	Estimate FY 1995	Difference FY 1985/FY 1984	
				Amount	Percent
RESEARCH & RELATED ACTIVITIES					
Mathematical and Physical Sciences					
Mathematical Sciences	\$34.8	\$41.5	\$50.5	\$9.0	21.7
Computer Research	29.3	33.9	39.3	5.4	16.1
Physics	89.2	105.9	121.8	15.9	15.0
Chemistry	67.6	80.0	92.1	12.1	15.1
Materials Research	81.1	97.5	113.0	15.5	15.9
Subtotal	302.0	358.8	416.7	57.9	16.1
International Awards	-1.5 ¹				
Subtotal, MPS	300.5	358.8	416.7	57.9	16.1
Engineering					
Electrical, Computer & Systems Engineering	29.5	36.0	44.7	8.7	24.3
Chemical & Process Engineering	22.6	26.6	32.5	5.9	22.4
Civil & Environmental Engineering	30.5	33.8	39.8	6.0	17.7
Mechanical Engineering and Applied Mechanics	19.4	24.3	30.1	5.8	23.4
Subtotal	102.0	120.7	147.1	26.4	21.8
International Awards	-0.9 ¹				
Subtotal, Engineering	101.1	120.7	147.1	26.4	21.8
Biological, Behavioral, and Social Sciences					
Physiology, Cellular & Molecular Biology	87.3	102.1	116.4	14.3	14.0
Biotic Systems and Resources	46.0	53.4	59.9	6.5	12.1
Behavioral and Neural Sciences	34.0	38.5	42.2	3.7	9.8
Social & Economic Sciences	20.3	24.6	28.0	3.4	13.8
Information Science and Technology	5.5	6.1	6.6	0.5	8.2
Subtotal	193.1	224.7	253.1	28.4	12.7
International Awards	-1.9 ¹				
Subtotal, BBS	191.2	224.7	253.1	28.4	12.7
Astronomical, Atmospheric, Earth and Ocean Sciences					
Astronomical Sciences	62.7	78.2	93.4	15.2	19.5
Atmospheric Sciences	75.5	89.3	98.6	9.3	10.3
Earth Sciences	34.9	41.5	48.6	7.1	17.1
Ocean Sciences	102.5	113.7	124.9	11.2	9.9
Arctic Research Program	6.2	7.4	8.0	0.6	8.2
Subtotal	281.8	330.1	373.5	43.4	13.2
International Awards	-1.0 ¹				
Subtotal, AAEO	280.8	330.1	373.5	43.4	13.2
Scientific, Technological, and International Affairs					
Industrial Science and Technological Innovation	14.5	17.6	23.4	5.8	33.0
International Cooperative Scientific Activities	4.6	5.5	5.5	—0—	—0—
Policy Research & Analysis	4.3	4.6	4.7	0.1	2.2
Science Resources Studies	3.6	4.2	4.3	0.1	2.4
Research Initiation and Improvement	11.8	8.9	9.0	0.1	0.9
Subtotal	38.8	40.8	46.9	6.1	14.9
International Awards	5.3 ²				
Subtotal, STIA	44.1	40.8	46.9	6.1	14.9

**BUDGET SUMMARY OF OBLIGATIONS BY ACTIVITY AND
SUBACTIVITY SHOWING DOLLAR PERCENTAGE CHANGES,
FY 1985/FY 1984 - CONTINUED**

(Millions of Dollars)

Activity & Subactivity	Actual 1983	Current Plan FY 1984	Estimate FY 1985	Difference FY 1985/FY 1984	
				Amount	Percent
Program Development and Management	65.7	66.6	70.9	4.3	6.5
Total, Research and Related Activities	963.4	1,141.7	1,308.2	166.5	14.6
U.S. ANTARCTIC PROGRAM					
U.S. Antarctic Research Program	9.0	10.2	11.0	0.8	7.4
Operations Support	74.2	92.2	104.1	11.9	12.9
Total, U.S. Antarctic Program	83.2	102.4	115.1	12.7	12.3
SCIENCE AND ENGINEERING EDUCATION					
Graduate Research Fellowships	15.0	20.3	21.0	0.7	3.4
Pre-College Science and Mathematics Education	1.1	54.7	54.7	—0—	—0—
Subtotal	16.1	75.0	75.7	0.7	0.9
FY 1983 Carryover	—0—	13.9	—0—	-13.9	-100.0
Total, Science and Engineering Education	16.1	88.9	75.7	-13.2	-14.9
SPECIAL FOREIGN CURRENCY					
Research and Related Activities	3.1	2.9	2.8	-0.1	-3.9
Total, Special Foreign Currency	3.1	2.9	2.8	-0.1	-3.9
Total, NSF	\$1,085.8	\$1,335.9	\$1,501.8	\$165.9	12.4

¹ Obligations actually incurred under the Scientific, Technological, and International Affairs activity. Included in research activities for comparison of FY 1983 with FY 1984 and FY 1985.

² Actual obligations incurred under the Scientific, Technological, and International Affairs activity. Transferred to research activities for comparability of FY 1983 with FY 1984 and FY 1985.

**SUMMARY BUDGET INFORMATION
BY ACTIVITY AND SUBACTIVITY
FY 1983-FY 1985**

The following tables summarize the National Science Foundation's FY 1983 through FY 1985 budgets by appropriation title.

Activity	Actual FY 1983	Request FY 1984	Current Plan FY 1984	Estimate FY 1985	Difference FY 1985/84
A. Summary of Funding Level by Activity					
Research and Related Activities					
Mathematical and Physical Sciences	\$300,435,512	\$364,300,000	\$356,823,000	\$416,710,000	\$57,887,000
Engineering	101,130,585	123,000,000	120,723,000	147,100,000	26,377,000
Biological, Behavioral and Social Sciences ..	191,233,848	223,600,000	224,858,000	253,120,000	28,462,000
Astronomical, Atmospheric, Earth and Ocean Sciences	260,798,073	334,900,000	330,041,000	373,480,000	43,439,000
Scientific, Technological and International Affairs	44,127,409	36,800,000	40,822,330	46,900,000	6,077,670
Program Development and Management	55,696,973	66,000,000	66,592,350	70,902,000	4,309,650
Subtotal, Research and Related Activities	983,422,400	1,148,600,000	1,141,059,680	1,308,212,000	166,552,320
Unobligated Balances and Other Adjustments	-5,318,685	—0—	-704,680	—0—	704,680
Research and Related Activities Appropriation	978,103,715	1,148,600,000	1,140,955,000	1,308,212,000	167,257,000
U.S. Antarctic Program Activities					
U.S. Antarctic Research Program	5,996,285	10,000,000	10,244,400	11,000,000	755,600
Operations Support	74,200,000	92,100,000	92,211,600	104,080,000	11,868,400
U.S. Antarctic Program Activities	83,196,285	102,100,000	102,456,000	115,080,000	12,624,000
Science and Engineering Education Activities					
Graduate Research Fellowships	14,978,187	19,000,000	20,300,000	21,000,000	700,000
Pre-College Science and Mathematics Education	1,108,403	20,000,000	54,700,000	54,700,000	—0—
Subtotal	16,086,570	39,000,000	75,000,000	75,700,000	700,000
FY 1983 Carryover	—0—	—0—	13,913,430	—0—	-13,913,430
Subtotal, Science and Engineering Education Activities	16,086,570	39,000,000	88,913,430	75,700,000	-13,213,430
Unobligated Balances and Other Adjustments	13,913,430	—0—	-13,913,430	—0—	13,913,430
Science and Engineering Education Activities Appropriation	30,000,000	39,000,000	75,000,000	75,700,000	700,000
Special Foreign Currency Program					
Research and Related Activities	5,084,975	2,800,000	2,913,680	2,800,000	-113,680
Unobligated Balances and Other Adjustments	-884,975	—0—	-13,680	—0—	13,680
Special Foreign Currency Appropriation	2,200,000	2,800,000	2,900,000	2,800,000	-100,000
TOTAL NSF APPROPRIATIONS	1,093,509,000	1,292,300,000	1,321,311,000	1,501,792,000	180,481,000

Level of Funding by Program—Continued

Activity	Actual FY 1983	Request FY 1984	Current Plan FY 1984	Estimate FY 1985	Difference FY 1985/84
B. Mathematical and Physical Sciences					
I. Mathematical Sciences					
Classical Analysis	\$3,222,512	\$4,100,000	\$3,900,000	\$4,800,000	\$900,000
Modern Analysis	3,400,964	4,150,000	4,100,000	4,950,000	850,000
Geometric Analysis	3,138,251	3,850,000	3,800,000	4,700,000	900,000
Topology and Foundations	4,321,936	5,150,000	4,900,000	5,850,000	950,000
Algebra and Number Theory	5,599,095	6,600,000	6,550,000	7,850,000	1,300,000
Applied Mathematics	4,137,254	5,300,000	5,280,000	6,700,000	1,420,000
Statistics and Probability	3,678,600	4,700,000	4,670,000	6,000,000	1,330,000
Special Projects	7,257,244	8,325,000	8,300,000	9,650,000	1,350,000
Subtotal	\$34,755,856	\$42,175,000	\$41,500,000	\$50,500,000	\$9,000,000
II. Computer Research					
Theoretical Computer Science ..	\$3,355,585	\$3,700,000	\$3,700,000	\$4,300,000	\$600,000
Software Systems Science	3,150,586	3,700,000	3,700,000	4,200,000	500,000
Software Engineering	3,068,201	3,500,000	3,400,000	3,700,000	300,000
Intelligent Systems	3,016,985	3,500,000	3,400,000	3,650,000	250,000
Computer Systems Design	3,118,293	3,600,000	3,500,000	4,000,000	500,000
Coordinated Experimental Research	11,179,621	13,725,000	13,700,000	16,700,000	3,000,000
Special Projects	1,222,374	1,450,000	1,100,000	1,150,000	50,000
Computer Research Equipment ..	1,227,623	1,500,000	1,400,000	1,650,000	250,000
Subtotal	\$29,339,448	\$34,675,000	\$33,900,000	\$39,350,000	\$5,450,000
III. Physics					
Elementary Particle Physics	\$28,752,127	\$36,650,000	\$35,900,000	\$42,500,000	\$6,600,000
Intermediate Energy Nuclear Physics	13,937,470	17,400,000	17,000,000	19,150,000	2,150,000
Nuclear Physics	20,535,006	23,000,000	22,500,000	24,820,000	2,320,000
Atomic, Molecular, and Plasma Physics	10,576,046	12,500,000	12,300,000	13,600,000	1,300,000
Theoretical Physics	10,479,130	12,100,000	12,100,000	13,600,000	1,700,000
Gravitational Physics	4,863,789	6,000,000	6,100,000	7,900,000	1,800,000
Subtotal	\$80,143,570	\$107,650,000	\$105,900,000	\$121,770,000	\$15,870,000
IV. Chemistry					
Structural Chemistry and Thermodynamics	\$12,951,631	\$15,410,000	\$13,650,000	\$15,470,000	\$1,820,000
Chemical Physics	10,653,102	12,800,000	13,110,000	14,780,000	1,670,000
Chemical Dynamics	13,606,345	15,640,000	14,460,000	16,950,000	2,490,000
Chemical Analysis	7,137,787	8,410,000	9,560,000	10,960,000	1,400,000
Synthetic Inorganic and Organometallic Chemistry	7,083,120	8,420,000	7,860,000	9,120,000	1,260,000
Synthetic Organic and Natural Products Chemistry	8,352,314	9,720,000	9,730,000	11,310,000	1,580,000
Chemical Instrumentation	7,844,145	9,850,000	11,630,000	13,500,000	1,870,000
Subtotal	\$67,626,444	\$80,250,000	\$80,000,000	\$92,060,000	\$12,060,000
V. Materials Research					
Solid State Physics	\$8,978,134	\$10,800,000	\$10,600,000	\$12,220,000	\$1,620,000
Solid State Chemistry	6,479,613	8,000,000	7,670,000	8,990,000	1,320,000
Low Temperature Physics	6,216,345	7,400,000	7,290,000	8,180,000	890,000
Condensed Matter Theory	6,582,229	8,000,000	7,610,000	8,890,000	1,280,000
Metallurgy	7,802,955	9,500,000	8,990,000	10,300,000	1,310,000
Ceramics and Electronic Materials	4,569,859	5,400,000	5,550,000	6,870,000	1,320,000
Polymers	5,489,477	6,800,000	6,380,000	7,570,000	1,190,000
Instrumentation for Materials Research	3,993,273	7,800,000	6,470,000	7,780,000	1,310,000
Materials Research Laboratories	23,426,273	27,750,000	26,503,000	30,090,000	3,587,000
National Facilities	7,539,814	8,300,000	10,460,000	12,110,000	1,650,000
Subtotal	\$81,079,972	\$99,550,000	\$97,523,000	\$113,000,000	\$15,477,000
Subtotal	\$301,947,200	\$384,300,000	\$358,623,000	\$416,710,000	\$57,687,000
Adjustment to International Awards	-1,511,778 ¹				

Level of Funding by Program—Continued

Activity	Actual FY 1983	Request FY 1984	Current Plan FY 1984	Estimate FY 1985	Difference FY 1985/84
TOTAL, MATHEMATICAL AND PHYSICAL SCIENCES	\$300,435,512	\$364,300,000	\$368,823,000	\$418,710,000	\$57,887,000
C. Engineering					
I. Electrical, Computer, and Systems Engineering					
Automation, Instrumentation, and Sensing Systems	\$2,949,661	\$3,800,000	\$3,700,000	\$4,800,000	\$1,100,000
Electrical and Optical Communications	5,117,429	6,350,000	6,177,000	7,330,000	1,153,000
Computer Engineering	2,638,800	3,700,000	3,700,000	5,100,000	1,400,000
Quantum Electronics, Waves and Beams	4,669,478	5,400,000	5,300,000	6,900,000	1,600,000
Solid State and Microstructures Engineering	5,512,660	7,200,000	7,000,000	8,300,000	1,300,000
Systems Theory and Operations Research	4,615,762	5,400,000	5,300,000	6,400,000	1,100,000
Bioengineering and Research for the Handicapped:					
Bioengineering	2,000,000	2,550,000	2,500,000	3,050,000	550,000
Science and Technology to Aid the Handicapped	2,026,829	2,300,000	2,300,000	2,850,000	550,000
Subtotal	\$4,026,829	\$4,850,000	\$4,800,000	\$5,900,000	\$1,100,000
Subtotal	\$29,530,619	\$36,700,000	\$35,977,000	\$44,730,000	\$8,753,000
II. Chemical and Process Engineering					
Kinetics, Catalysis and Reaction Engineering	\$3,543,275	\$4,490,000	\$4,500,000	\$5,600,000	\$1,100,000
Chemical and Biochemical Processes	4,508,057	5,800,000	5,883,000	7,180,000	1,487,000
Engineering Energetics	3,518,448	3,800,000	3,800,000	4,210,000	410,000
Thermodynamics and Transport Phenomena	3,942,109	4,240,000	4,100,000	4,940,000	840,000
Particulate and Multiphase Processes	3,251,156	3,950,000	3,900,000	4,540,000	640,000
Separation Processes	1,717,898	2,330,000	2,300,000	3,440,000	1,240,000
Minerals and Primary Materials Processing	2,078,673	2,490,000	2,400,000	2,620,000	220,000
Subtotal	\$22,559,616	\$27,100,000	\$26,583,000	\$32,530,000	\$5,947,000
III. Civil and Environmental Engineering					
Geotechnical Engineering	\$3,022,170	\$4,000,000	\$3,900,000	\$4,500,000	\$700,000
Structural Mechanics	2,905,896	3,700,000	3,500,000	4,700,000	1,200,000
Hydraulics, Hydrology, and Water Resources Engineering	3,982,635	4,400,000	3,478,000	4,300,000	822,000
Environmental and Water Quality Engineering	3,109,818	3,300,000	3,300,000	3,800,000	500,000
Construction Engineering and Building Research	—0—	—0—	2,000,000	2,400,000	400,000
Earthquake Hazard Mitigation Siting	7,549,323	8,100,000	8,200,000	8,960,000	760,000
Design	7,630,924	8,600,000	8,600,000	10,100,000	1,500,000
Societal Response	2,288,779	2,300,000	800,000	900,000	100,000
Subtotal	\$17,469,026	\$19,000,000	\$17,600,000	\$19,960,000	\$2,360,000
Subtotal	\$30,489,347	\$34,400,000	\$33,778,000	\$39,760,000	\$5,982,000

Level of Funding by Program—Continued

Activity	Actual FY 1983	Request FY 1984	Current Plan FY 1984	Estimate FY 1985	Difference FY 1985/84
IV. Mechanical Engineering and Applied Mechanics					
Fluid Mechanics	\$4,523,180	\$5,400,000	\$5,300,000	\$6,400,000	\$1,100,000
Heat Transfer	4,259,322	5,700,000	5,585,000	7,030,000	1,445,000
Solid Mechanics	3,891,688	4,700,000	4,700,000	5,850,000	1,150,000
Mechanical Systems	3,247,582	4,450,000	4,400,000	5,400,000	1,000,000
Production Research	3,509,785	4,550,000	4,400,000	5,400,000	1,000,000
Subtotal	\$19,431,517	\$24,800,000	\$24,385,000	\$30,080,000	\$5,695,000
Subtotal	\$102,011,099	\$123,000,000	\$120,723,000	\$147,100,000	\$26,377,000
Adjustment to International Awards	-880,514 ¹				
TOTAL, ENGINEERING	\$101,130,585	\$123,000,000	\$120,723,000	\$147,100,000	\$26,377,000
D. Biological, Behavioral, and Social Sciences					
I. Physiology, Cellular and Molecular Biology					
Molecular and Genetic Biosciences					
Biochemistry	\$11,381,969	\$12,924,000	\$12,850,000	\$14,850,000	\$1,800,000
Biophysics	10,708,163	12,433,000	12,380,000	14,385,000	2,025,000
Genetic Biology	12,178,685	15,076,200	14,900,000	17,150,000	2,250,000
Metabolic Biology	11,590,803	14,133,000	14,000,000	15,400,000	1,400,000
Alternative Biological Resources	2,082,035	2,350,000	2,350,000	2,585,000	235,000
Subtotal	\$47,921,655	\$56,916,200	\$56,480,000	\$64,170,000	\$7,110,000
Cellular and Physiological Biosciences					
Cell Biology	\$9,108,068	\$10,279,000	\$10,229,000	\$11,800,000	\$1,374,000
Cellular Physiology	6,404,226	7,444,000	7,406,000	8,330,000	894,000
Developmental Biology	10,319,391	12,675,800	12,611,000	14,400,000	1,789,000
Regulatory Biology	8,222,646	8,900,000	8,855,000	9,960,000	1,105,000
Subtotal	\$34,054,321	\$39,298,800	\$39,098,000	\$44,290,000	\$5,192,000
Biological Instrumentation	5,367,570	8,485,000	6,900,000	7,000,000	1,400,000
Subtotal	\$87,343,546	\$102,700,000	\$102,068,000	\$116,360,000	\$14,302,000
II. Biotic Systems and Resources					
Ecological Science					
Ecology	\$7,456,472	\$8,080,000	\$8,030,000	\$9,280,000	\$1,250,000
Ecosystem Studies	15,139,766	16,860,000	16,770,000	18,460,000	1,690,000
Subtotal	\$22,596,238	\$24,920,000	\$24,800,000	\$27,740,000	\$2,940,000
Systematic and Population Biology					
Systematic Biology	\$8,763,127	\$11,040,000	\$11,000,000	\$12,330,000	\$1,330,000
Population Biology and Physiological Ecology	6,858,456	8,840,000	8,800,000	10,040,000	1,240,000
Biological Research Resources	7,739,999	8,800,000	8,800,000	9,775,000	970,000
Subtotal	\$23,361,582	\$28,680,000	\$28,600,000	\$32,140,000	\$3,540,000
Subtotal	\$45,957,820	\$53,600,000	\$53,400,000	\$59,880,000	\$6,480,000

Level of Funding by Program—Continued

Activity	Actual FY 1983	Request FY 1984	Current Plan FY 1984	Estimate FY 1988	Difference FY 1985/84
III. Behavioral and Neural Sciences					
Neuroscience					
Molecular and Cellular					
Neurobiology	\$4,701,594	\$4,600,000	\$4,600,000	\$5,300,000	\$700,000
Integrative Neural Systems	3,739,207	4,200,000	4,200,000	5,000,000	800,000
Developmental Neuroscience	3,256,823	4,600,000	4,700,000	5,480,000	780,000
Sensory Physiology and					
Perception	5,768,981	8,800,000	8,800,000	7,300,000	500,000
Psychobiology	3,865,374	4,200,000	4,200,000	4,400,000	200,000
Subtotal	\$21,332,979	\$24,400,000	\$24,500,000	\$27,480,000	\$2,980,000
Cognitive Science					
Memory and Cognitive					
Processes	\$2,267,038	\$2,600,000	\$2,600,000	\$2,800,000	\$200,000
Social and Developmental					
Psychology	2,265,001	2,200,000	2,600,000	2,700,000	100,000
Linguistics	2,200,013	2,400,000	2,400,000	2,500,000	100,000
Subtotal	\$6,732,052	\$7,200,000	\$7,600,000	\$8,000,000	\$400,000
Anthropology	5,856,390	6,300,000	6,400,000	6,800,000	400,000
Subtotal	\$34,021,421	\$37,900,000	\$38,500,000	\$42,280,000	\$3,780,000
IV. Social and Economic Science					
Economics and Geography					
Economics	\$7,196,829	\$9,100,000	\$9,400,000	\$10,250,000	\$850,000
Geography	809,862	1,000,000	1,000,000	1,300,000	300,000
Subtotal	\$8,006,791	\$10,100,000	\$10,400,000	\$11,550,000	\$1,150,000
Social Measurement and					
Analysis					
Sociology	\$2,450,686	\$2,800,000	\$2,950,000	\$3,650,000	\$700,000
Measurement Methods and					
Data Resources	3,314,846	3,500,000	3,600,000	3,400,000	-200,000
History and Philosophy of					
Science	1,109,020	1,200,000	1,350,000	1,600,000	250,000
Subtotal	\$6,874,552	\$7,500,000	\$7,900,000	\$8,650,000	\$750,000
Political and Policy Sciences					
Political Science	\$2,403,117	\$2,800,000	\$2,800,000	\$3,600,000	\$800,000
Law and Social Sciences	1,248,200	1,250,000	1,400,000	1,700,000	300,000
Regulation and Policy Analysis	884,000	900,000	1,100,000	1,300,000	200,000
Decision and Management					
Science	872,350	950,000	1,000,000	1,200,000	200,000
Subtotal	\$5,408,667	\$6,700,000	\$6,300,000	\$7,800,000	\$1,500,000
Subtotal	\$20,290,010	\$23,300,000	\$24,600,000	\$28,000,000	\$3,400,000
V. Information Science and Technology					
Information Science	\$4,001,326	\$4,000,000	\$4,000,000	\$4,000,000	\$ —0—
Information Technology	670,000	1,000,000	1,000,000	1,300,000	300,000
Information Impact	806,499	1,100,000	1,100,000	1,300,000	200,000
Subtotal	\$5,477,827	\$6,100,000	\$6,100,000	\$6,600,000	\$500,000
Subtotal	\$193,060,624	\$223,600,000	\$224,658,000	\$253,120,000	\$28,467,000
Adjustment to International					
Awards	-1,956,776 ¹				
TOTAL, BIOLOGICAL, BEHAVIORAL AND SOCIAL SCIENCES	\$191,233,848	\$223,600,000	\$224,658,000	\$253,120,000	\$28,462,000

Level of Funding by Program—Continued

Activity	Actual FY 1983	Request FY 1984	Current Plan FY 1984	Estimate FY 1985	Difference FY 1985/84
E. Astronomical, Atmospheric, Earth, and Ocean Sciences					
I. Astronomical Sciences					
Astronomy Project Support					
Solar System Astronomy	\$699,596	\$1,250,000	\$1,250,000	\$1,270,000	\$20,000
Stars and Stellar Evolution	5,408,851	8,400,000	8,300,000	8,490,000	190,000
Galactic Astronomy	3,734,346	4,600,000	4,500,000	5,390,000	790,000
Extragalactic Astronomy	4,908,126	5,840,000	5,850,000	7,520,000	1,670,000
Astronomical Instrumentation and Development	6,662,894	9,800,000	9,700,000	8,230,000	-1,470,000
Electromagnetic Spectrum Management	116,000	110,000	100,000	100,000	—0—
Subtotal	\$21,519,773	\$28,000,000	\$27,700,000	\$26,900,000	\$1,200,000
National Astronomy and Ionosphere Center					
Scientific Research Support ..	\$5,425,000	\$6,515,000	\$6,515,000	\$6,615,000	\$100,000
Less NASA Support	-315,000	-315,000	-315,000	-315,000	—0—
Subtotal	\$5,110,000	\$6,200,000	\$6,200,000	\$6,300,000	\$100,000
Kitt Peak National Observatory/ Cerro Tololo Inter-American Observatory/National Solar Observatory					
Scientific Research Support ..	\$20,194,000	\$24,530,000	\$23,602,500	\$24,749,000	\$1,146,500
Management Fee	385,000	385,000	462,500	486,000	23,500
Less DOD Support	-390,000	-415,000	-415,000	-435,000	-20,000
Subtotal	\$20,189,000	\$24,500,000	\$23,650,000	\$24,800,000	\$1,150,000
National Radio Astronomy Observatory					
Scientific Research Support ..	\$15,585,000	\$20,270,000	\$20,270,000	\$33,070,000	\$12,800,000
VLBA Construction	—0—	(2,500,000)	(2,500,000)	(15,000,000)	(12,500,000)
Management Fee	315,000	330,000	330,000	330,000	—0—
Subtotal	\$15,900,000	\$20,000,000	\$20,000,000	\$33,400,000	\$12,800,000
Subtotal	\$62,718,773	\$79,300,000	\$78,150,000	\$93,400,000	\$15,250,000
II. Atmospheric Sciences					
Atmospheric Sciences Project Support					
Aeronomy	\$5,481,320	\$6,000,000	\$6,100,000	\$6,550,000	\$450,000
Atmospheric Chemistry	5,592,432	6,900,000	6,700,000	7,250,000	550,000
Climate Dynamics	6,066,296	7,400,000	7,200,000	7,790,000	590,000
Experimental Meteorology	3,837,796	5,400,000	5,200,000	5,640,000	440,000
Global Atmospheric Research Program (GARP)	5,781,432	4,800,000	4,800,000	4,500,000	-300,000
Meteorology	6,969,383	8,500,000	8,400,000	9,100,000	700,000
Solar Terrestrial Research	5,951,422	7,200,000	7,100,000	7,690,000	590,000
Subtotal	\$39,650,001	\$46,200,000	\$45,500,000	\$48,520,000	\$3,020,000

Level of Funding by Program—Continued

Activity	Actual FY 1983	Request FY 1984	Current Plan FY 1984	Estimate FY 1985	Difference FY 1985/84
National Center for Atmospheric Research					
Atmospheric Analysis and Prediction	\$2,777,000	\$3,547,000	\$3,488,000	\$3,645,000	\$157,000
Atmospheric Chemistry and Aeronomy	2,114,000	2,731,000	2,740,000	2,863,000	123,000
Convective Storms	2,071,000	2,340,000	2,363,000	2,386,000	23,000
Advanced Study Programs	1,102,000	1,366,000	1,469,000	1,535,000	66,000
High Altitude Observatory	2,877,000	3,622,000	3,529,000	3,456,000	-73,000
Atmospheric Technology	5,913,000	7,511,000	7,650,000	7,472,000	-178,000
Scientific Computing	7,291,000	10,377,000	9,443,000	13,425,000	3,982,000
Administration and Support Services	4,119,000	4,842,000	4,716,000	4,928,000	212,000
Physical Plant Operation and Maintenance	3,238,000	3,364,000	3,702,000	5,269,000	1,567,000
Contractor Fee	800,000	900,000	900,000	941,000	41,000
Subtotal	\$32,400,000	\$40,600,000	\$40,000,000	\$45,920,000	\$5,920,000
Upper Atmospheric Research Facilities	3,464,352	3,800,000	3,800,000	4,100,000	300,000
Subtotal	\$75,514,353	\$90,600,000	\$89,300,000	\$98,540,000	\$9,240,000
III. Earth Sciences					
Stratigraphy and Paleontology ..	\$3,694,403	\$3,800,000	\$3,700,000	\$3,900,000	\$200,000
Surficial Processes	2,282,094	2,600,000	2,700,000	2,900,000	200,000
Crustal Structure and Tectonics ..	4,290,889	3,900,000	3,800,000	4,000,000	200,000
Seismology	4,736,764	4,800,000	4,700,000	5,000,000	300,000
Experimental and Theoretical Geophysics	4,078,420	4,800,000	4,700,000	5,000,000	300,000
Petrogenesis and Mineral Resources	3,540,565	4,000,000	3,800,000	4,100,000	200,000
Volcanology and Mantle Geochemistry	2,601,616	3,700,000	3,800,000	3,900,000	300,000
Experimental and Theoretical Geochemistry	4,923,510	5,800,000	5,700,000	6,100,000	400,000
Instrumentation and Facilities ..	2,270,987	5,000,000	5,000,000	6,000,000	1,000,000
Continental Lithosphere	2,428,732	3,700,000	3,700,000	7,700,000	4,000,000
Subtotal	\$34,847,980	\$42,100,000	\$41,500,000	\$48,600,000	\$7,100,000
IV. Ocean Sciences					
Ocean Science Research Support					
Physical Oceanography	\$14,680,536	\$15,600,000	\$15,500,000	\$17,200,000	\$1,700,000
Marine Chemistry	10,798,030	12,300,000	12,000,000	13,400,000	1,400,000
Submarine Geology and Geophysics	12,613,559	14,900,000	14,500,000	16,100,000	1,600,000
Biological Oceanography	11,825,165	12,900,000	12,600,000	14,200,000	1,600,000
Subtotal	\$49,917,291	\$55,700,000	\$54,600,000	\$60,900,000	\$6,300,000
Oceanographic Facilities and Support					
Operations	\$26,199,830	\$25,900,000	\$25,400,000	\$28,200,000	\$2,800,000
Oceanographic Technology ..	5,412,208	7,500,000	7,400,000	8,240,000	840,000
Subtotal	\$31,612,038	\$33,400,000	\$32,800,000	\$36,440,000	\$3,640,000
Ocean Drilling Program					
Ocean Drilling Program	\$27,825,949	\$29,500,000	\$29,500,000	\$37,600,000	\$8,100,000
Less Foreign Funding	-6,315,260	-1,200,000	-1,200,000	-10,000,000	-8,800,000
Less Other U.S. Agency Funding	-510,689	-2,000,000	-2,000,000	-0—	2,000,000
Subtotal	\$21,000,000	\$26,300,000	\$26,300,000	\$27,600,000	\$1,300,000
Subtotal	\$102,529,329	\$115,400,000	\$113,700,000	\$124,940,000	\$11,240,000

Level of Funding by Program—Continued

Activity	Actual FY 1983	Request FY 1984	Current Plan FY 1984	Estimate FY 1985	Difference FY 1985/84
V. Arctic Research Program					
Atmospheric Sciences	\$887,700	\$1,000,000	\$980,000	\$1,100,000	\$120,000
Biological Sciences	1,412,324	2,000,000	1,971,000	2,200,000	229,000
Earth Sciences	1,180,558	1,100,000	1,080,000	1,200,000	120,000
Glaciology	1,366,262	2,000,000	1,980,000	2,120,000	140,000
Oceanography	1,199,700	1,225,000	1,205,000	1,205,000	—0—
Information and Advisory Services	171,700	175,000	175,000	175,000	—0—
Subtotal	\$6,218,244	\$7,500,000	\$7,391,000	\$8,000,000	\$609,000
Subtotal	\$281,828,679	\$334,900,000	\$330,041,000	\$373,480,000	\$43,439,000
Adjustment to International Awards	-1,030,606 ¹				
TOTAL, ASTRONOMICAL, ATMOSPHERIC, EARTH, AND OCEAN SCIENCES	\$280,798,073	\$334,900,000	\$330,041,000	\$373,480,000	\$43,439,000
F. Scientific, Technological, and International Affairs					
I. Industrial Science and Technological Innovation					
Industry/University Cooperative Research Projects	\$6,010,929	\$7,000,000	\$7,000,000	\$7,000,000	\$ —0—
Small Business Innovation Research	5,476,466	5,500,000	6,600,000	12,400,000	5,800,000
Industry/University Cooperative Research Centers	2,019,798	3,000,000	3,000,000	3,000,000	—0—
Productivity Improvement Research	999,632	1,000,000	1,000,000	1,000,000	—0—
Subtotal	\$14,506,825	\$16,500,000	\$17,600,000	\$23,400,000	\$5,800,000
II. International Cooperative Scientific Activities					
International Cooperative Science	\$3,582,834	\$3,900,000	\$4,400,000	\$4,400,000	\$ —0—
International Science Organizations and Resources	1,068,083	1,100,000	1,100,000	1,100,000	—0—
Subtotal	\$4,650,917	\$5,000,000	\$5,500,000	\$5,500,000	\$ —0—
Support by Discipline-Oriented Programs	(5,279,674) ²	(7,900,000)	(7,400,000)	(8,300,000)	(900,000)
Subtotal	(\$9,930,591)	(\$12,900,000)	(\$12,900,000)	(\$13,800,000)	(\$900,000)
III. Policy Research and Analysis					
Science and Innovation Policy ...	\$1,770,849	\$1,750,000	\$1,750,000	\$1,800,000	\$50,000
Policy Sciences	1,520,407	1,850,000	1,850,000	1,800,000	-50,000
Technology and Resource Policy	979,542	1,000,000	1,000,000	1,100,000	100,000
Subtotal	\$4,270,798	\$4,600,000	\$4,600,000	\$4,700,000	\$100,000
IV. Science Resources Studies					
Scientific and Technical Personnel	\$1,894,592	\$2,100,000	\$2,100,000	\$2,100,000	\$ —0—
Funding of Science and Technology	1,204,865	1,300,000	1,300,000	1,400,000	100,000
Modeling and Special Science and Technology Indicators ...	551,124	800,000	800,000	800,000	—0—
Subtotal	\$3,650,381	\$4,200,000	\$4,200,000	\$4,300,000	\$100,000

Level of Funding by Program—Continued

Activity	Actual FY 1983	Request FY 1984	Current Plan FY 1984	Estimate FY 1985	Difference FY 1985/84
V. Research Initiation and Improvement					
Presidential Young Investigators Research Awards	\$ —0—	(\$6,000,000)	(\$11,900,000)	(\$23,800,000)	(\$11,900,000)
Support for Predominantly Undergraduate Institutions	(28,941,000)	(36,769,000) ^a	(36,769,000) ^a	(42,422,000)	(5,653,000)
Visiting Professorships for Women	1,940,018	1,000,000	2,000,000	2,000,000	—0—
Research Opportunities for Women	—0—	—0—	—0—	500,000	500,000
Minority Research Initiation	1,980,507	2,000,000	2,500,000	2,500,000	—0—
Research Improvement in Minority Institutions	1,980,500	2,000,000	2,500,000	2,500,000	—0—
Intergovernmental Science and Technology	495,500	500,000	500,000	500,000	—0—
Ethics and Values in Science and Technology	990,929	1,000,000	1,000,000	1,000,000	—0—
Experimental Program to Stimulate Competitive Research	2,500,000	(2,500,000)	(2,500,000)	—0—	(-2,500,000)
NSF Planning and Evaluation	1,881,360	—0—	422,330	—0—	-422,330
NSF Planning and Evaluation	—0—	(2,000,000)	(2,000,000)	(2,000,000)	—0—
Subtotal	\$11,768,814	\$6,500,000	\$8,922,330	\$9,000,000	\$77,670
Support by Discipline-Oriented Programs	(28,941,000)	(47,269,000)	(53,169,000)	(68,222,000)	(15,053,000)
Subtotal	(\$40,709,814)	(\$53,769,000)	(\$62,091,330)	(\$77,222,000)	(\$15,130,670)
Subtotal	\$38,847,735	\$36,800,000	\$40,822,330	\$46,900,000	\$6,077,670
Adjustment to International Awards	5,279,674 ^a				
TOTAL, SCIENTIFIC, TECHNOLOGICAL AND INTERNATIONAL AFFAIRS	\$44,127,409	\$36,800,000	\$40,822,330	\$46,900,000	\$6,077,670
G. Program Development and Management					
Program Development and Management	\$65,696,973	\$66,000,000	\$66,592,350	\$70,902,000	\$4,309,650
Full-time Equivalent Employment—Permanent	1,060	1,053	1,053	1,053	—0—
Full-time Equivalent Employment—Other	153	141	141	141	—0—
Full-time Equivalent Employment—Total	1,213	1,194	1,194	1,194	—0—
TOTAL, RESEARCH AND RELATED ACTIVITIES	\$983,422,400	\$1,148,600,000	\$1,141,659,680	\$1,308,212,000	\$166,552,320
Unobligated Balances, and Other Adjustments	-5,318,685	—0—	-704,680	—0—	704,680
Research and Related Activities Appropriation	\$978,103,715	\$1,148,600,000	\$1,140,955,000	\$1,308,212,000	\$167,257,000
H. U.S. Antarctic Program					
I. U.S. Antarctic Research Program					
Atmospheric Sciences	\$1,900,113	\$2,100,000	\$2,100,000	\$2,200,000	\$100,000
Biological Sciences	2,214,270	2,400,000	2,600,408	2,500,000	-100,408
Earth Sciences	1,457,890	1,700,000	1,700,000	1,800,000	100,000
Glaciology	1,400,000	1,600,000	1,600,000	1,900,000	300,000
Oceanography	1,372,227	1,550,000	1,593,992	1,900,000	306,008
Information and Advisory Services	651,785	650,000	650,000	700,000	50,000
Subtotal	\$8,998,285	\$10,000,000	\$10,244,400	\$11,000,000	\$755,600

Level of Funding by Program—Continued

Activity	Actual FY 1983	Request FY 1984	Current Plan FY 1984	Estimate FY 1985	Difference FY 1985/84
II. Operations Support					
Direct Science Support	\$10,800,000	\$12,100,000	\$12,100,000	\$11,800,000	\$-300,000
Base Level Support	55,300,000	80,400,000	60,511,600	68,980,000	8,468,400
Major Construction and Procurement	8,100,000	19,800,000	19,600,000	23,300,000	3,700,000
Subtotal	\$74,200,000	\$92,100,000	\$92,211,600	\$104,080,000	\$11,868,400
TOTAL, U.S. ANTARCTIC PROGRAM	\$83,196,285	\$102,100,000	\$102,456,000	\$115,080,000	\$12,624,000
I. Science and Engineering Education					
I. Graduate Research Fellowships					
Graduate Research Fellowships	\$14,978,167	\$19,000,000	\$20,300,000	\$21,000,000	\$700,000
FY 1983 Carryover	-0-	-0-	21,833	-0-	-21,833
Subtotal	\$14,978,167	\$19,000,000	\$20,321,833	\$21,000,000	\$678,167
II. PreCollege Science and Mathematics Education					
PreCollege Materials Development and Research	\$63,653	\$20,000,000	\$27,700,000	\$27,700,000	\$ -0-
FY 1983 Carryover	-0-	-0-	11,416,347	-0-	-11,416,347
PreCollege Teacher Development and Incentives	1,044,750	-0-	15,000,000	15,000,000	-0-
FY 1983 Carryover	-0-	-0-	2,475,250	-0-	-2,475,250
Special Activities	-0-	-0-	12,000,000	12,000,000	-0-
Subtotal	\$1,108,403	\$20,000,000	\$54,700,000	\$54,700,000	\$ -0-
FY 1983 Carryover	-0-	-0-	13,891,597	-0-	-13,891,597
Subtotal	\$1,108,403	\$20,000,000	\$68,591,597	\$54,700,000	\$-13,891,597
Subtotal	\$16,086,570	\$39,000,000	\$75,000,000	\$75,700,000	\$700,000
FY 1983 Carryover	-0-	-0-	13,913,430	-0-	-13,913,430
TOTAL, SCIENCE AND ENGINEERING EDUCATION	\$16,086,570	\$39,000,000	\$88,913,430	\$75,700,000	\$-13,213,430
Unobligated Balances, and Other Adjustments	13,913,430	-0-	-13,913,430	-0-	13,913,430
Science and Engineering Education Activities Appropriation	\$30,000,000	\$39,000,000	\$75,000,000	\$75,700,000	\$700,000
J. Special Foreign Currency Program:					
Research and Related Activities	\$3,084,975	\$2,600,000	\$2,913,680	\$2,800,000	\$-113,680
Unobligated Balances, and Other Adjustments	-884,975	-0-	-13,680	-0-	13,680
Special Foreign Currency Program Appropriation	\$2,200,000	\$2,600,000	\$2,900,000	\$2,800,000	\$-100,000
TOTAL NSF APPROPRIATIONS	\$1,093,500,000	\$1,292,300,000	\$1,321,311,000	\$1,501,792,000	\$180,481,000

Numbers enclosed in parentheses are non-adds for comparison purposes only.

¹ Included for comparison with FY 1984 and FY 1985. Actual obligations incurred in the Scientific, Technological and International Affairs activity.

² Obligations actually incurred in the Scientific, Technological and International Affairs activity. Transferred to research activities to facilitate comparison of FY 1983 with FY 1984 and FY 1985.

³ Includes \$3,000,000 requested as a non-add in the research activities under the Undergraduate College Research Support program element in the FY 1984 Justification of Estimates of Appropriations plus an estimated \$33,789,000 for additional support of such institutions by research activities.

NATIONAL SCIENCE FOUNDATION
RESEARCH AND RELATED ACTIVITIES APPROPRIATION
ANALYSIS OF CHANGES IN OBLIGATED LEVELS
FY 1983—FY 1985

	<i>Obligations</i>
FY 1983 Obligated Level	\$983,422,400
FY 1984:	
Increases:	
Mathematical and Physical Sciences	58,387,488
Engineering	19,592,415
Biological, Behavioral and Social Sciences	33,424,152
Astronomical, Atmospheric, Earth and Ocean Sciences	49,242,927
Program Development and Management	895,377
Subtotal	<u>161,542,359</u>
Decrease:	
Scientific, Technological and International Affairs	<u>-3,305,079</u>
FY 1984 Obligated Level	1,141,659,680
FY 1985:	
Increases:	
Mathematical and Physical Sciences	57,887,000
Engineering	26,377,000
Biological, Behavioral and Social Sciences	26,462,000
Astronomical, Atmospheric, Earth and Ocean Sciences	43,439,000
Scientific, Technological and International Affairs	6,077,670
Program Development and Management	4,309,650
Subtotal	<u>166,552,320</u>
FY 1985 Obligated Level	1,308,212,000

NATIONAL SCIENCE FOUNDATION

U.S. ANTARCTIC PROGRAM
ACTIVITIES APPROPRIATIONANALYSIS OF CHANGES IN OBLIGATED LEVELS
FY 1983—FY 1985

	Obligations
FY 1983 Obligated Level	\$83,196,285
FY 1984:	
Increases:	
U.S. Antarctic Research Program	1,248,115
Operations Support	18,011,600
Subtotal	19,259,715
FY 1984 Obligated Level	102,456,000
FY 1985:	
Increases:	
U.S. Antarctic Research Program	755,600
Operations Support	11,868,400
Subtotal	12,624,000
FY 1985 Obligated Level	115,080,000

NATIONAL SCIENCE FOUNDATION
SCIENCE AND ENGINEERING EDUCATION
ACTIVITIES APPROPRIATION
ANALYSIS OF CHANGES IN OBLIGATED LEVELS
FY 1983—FY 1985

	<i>Obligations</i>
FY 1983 Obligated Level	\$16,086,570
FY 1984:	
Increases:	
Graduate Research Fellowships	5,321,833
Pre-College Science and Mathematics Education	53,591,597
Subtotal	58,913,430
FY 1983 Carryover	13,913,430
Subtotal	72,826,860
FY 1984 Obligated Level	88,913,430
FY 1985:	
Increase:	
Graduate Research Fellowships	700,000
Decrease:	
FY 1983 Carryover	-13,913,430
FY 1985 Obligated Level	75,700,000

NATIONAL SCIENCE FOUNDATION
SPECIAL FOREIGN CURRENCY APPROPRIATION
ANALYSIS OF CHANGES IN OBLIGATED LEVELS
FY 1983—FY 1985

	<i>Obligations</i>
FY 1983 Obligated Level	\$3,084,975
FY 1984:	
Decrease:	
Research and Related Activities	-171,295
FY 1984 Obligated Level	2,913,680
FY 1985:	
Decrease:	
Research and Related Activities	-113,680
FY 1985 Obligated Level	\$2,800,000

NATIONAL SCIENCE FOUNDATION
PERCENTAGE DISTRIBUTION OF TOTAL OBLIGATIONS

FY 1983—FY 1985

	Actual FY 1983	Request FY 1984	Current Plan FY 1984	Estimate FY 1985
Research and Related Activities				
Mathematical and Physical Sciences	27.7	28.2	26.9	27.7
Engineering	9.3	9.5	9.0	9.8
Biological, Behavioral and Social Sciences	17.6	17.3	16.8	16.9
Astronomical, Atmospheric, Earth and Ocean Sciences	25.9	25.9	24.7	24.9
Scientific, Technological and International Affairs	4.1	2.9	3.1	3.1
Program Development and Management	6.0	5.1	5.0	4.7
Subtotal	90.6	88.9	85.5	87.1
U.S. Antarctic Program				
U.S. Antarctic Research Program	0.8	0.8	0.8	0.7
Operations Support	6.8	7.1	6.9	7.0
Subtotal	7.6	7.9	7.7	7.7
Science and Engineering Education				
Graduate Research Fellowships	1.4	1.5	1.5	1.4
Pre-College Science and Mathematics Education	0.1	1.5	4.1	3.6
Subtotal	1.5	3.0	5.6	5.0
FY 1983 Carryover	—0—	—0—	1.0	—0—
Subtotal	1.5	3.0	6.6	5.0
Special Foreign Currency				
Special Foreign Currency	0.3	0.2	0.2	0.2
Total, NSF	100.0	100.0	100.0	100.0

**NATIONAL SCIENCE FOUNDATION
SUMMARY OF OBLIGATIONS BY MAJOR OBJECT CLASSIFICATION**

Object	Actual FY 1983	Budget Request FY 1984	Current Plan FY 1984	Estimate FY 1985	Difference FY 1985/84
Research and Related Activities					
Personnel Compensation	\$44,854,020	\$43,830,000	\$45,714,000	\$46,514,000	\$800,000
Personnel Benefits	4,415,611	4,340,000	4,616,000	4,728,000	112,000
Travel and Transportation of Persons	2,881,894	3,020,000	3,020,000	3,500,000	480,000
Transportation of Things	212,516	300,000	297,000	330,000	33,000
Rents and Communications	7,374,011	8,250,000	7,963,400	8,720,000	756,600
Printing and Reproduction	522,173	650,000	530,000	600,000	70,000
Other Contractual Services:					
Program Contracts	123,773,180	146,151,000	145,134,000	167,037,000	21,903,000
Program Development and Management					
Contract Services	3,642,134	3,905,000	3,089,750	3,571,000	481,250
Supplies and Materials	625,243	750,000	619,800	900,000	280,200
Equipment	1,157,711	925,000	712,400	2,009,000	1,296,600
Grants, Subsidies and Contributions:					
Program Grants	793,952,247	936,449,000	929,933,330	1,070,273,000	140,339,670
Program Development and Management					
Grants	11,860	30,000	30,000	30,000	—0—
Subtotal, Research and Related Activities	983,422,400	1,148,600,000	1,141,659,680	1,308,212,000	166,552,320
U.S. Antarctic Program					
Program Contracts	76,124,686	93,400,000	93,756,000	105,580,000	11,824,000
Program Grants	7,071,599	8,700,000	8,700,000	9,500,000	800,000
Subtotal, U.S. Antarctic Program	83,196,285	102,100,000	102,456,000	115,080,000	12,624,000
Science and Engineering Education Activities					
Program Contracts	1,965,000	3,000,000	2,000,000	2,000,000	—0—
Program Grants	14,121,570	36,000,000	88,913,430	73,700,000	-13,213,430
Subtotal, Science and Engineering Education Activities	16,086,570	39,000,000	88,913,430	75,700,000	-13,213,430
Special Foreign Currency					
Travel and Transportation of Persons	103,000	100,000	100,000	100,000	—0—
Program Contracts	185,000	325,000	170,000	170,000	—0—
Program Grants	2,796,975	2,175,000	2,543,680	2,530,000	-113,680
Subtotal, Special Foreign Currency	3,084,975	2,600,000	2,913,680	2,800,000	-113,680
Total, NSF	\$1,085,790,230	\$1,292,300,000	\$1,335,942,790	\$1,501,792,000	\$165,849,210

NATIONAL SCIENCE FOUNDATION

RESEARCH AND RELATED ACTIVITIES

For necessary expenses in carrying out the purposes of the National Science Foundation Act of 1950, as amended (42 U.S.C. 1861-1875); title IX of the National Defense Education Act of 1958 (42 U.S.C. 1876-1879), and the Act to establish a National Medal of Science (42 U.S.C. 1880-1881); services as authorized by 5 U.S.C. 3109; maintenance and operation of aircraft and purchase of flight services for research support; hire of passenger motor vehicles; not to exceed \$2,500 for official reception and representation expenses; not to exceed \$65,000,000 for program development and management in fiscal year 1983; uniforms or allowances therefor, as authorized by law (5 U.S.C. 5901-5902); rental of conference rooms in the District of Columbia; and reimbursement of the General Services Administration for security guard services. \$1,140,300,000 to remain available until September 30, 1984. *Provided*, That receipts for scientific support services and materials furnished by the National Research Centers and other National Science Foundation supported research facilities may be credited to this appropriation: *Provided further*, That to the extent that the amount appropriated is less than the total amount authorized to be appropriated for included program activities, all amounts, including floors and ceilings, specified in the authorizing Act for those program activities or their subactivities shall be reduced proportionally.

\$70,902,000

\$1,308,212,000

1986

(Department of Housing and Urban Development -
Independent Agencies Appropriation Act, 1984.)

UNITED STATES ANTARCTIC PROGRAM ACTIVITIES

For necessary expenses in carrying out the research and operational support for the U.S. Antarctic Program pursuant to the National Science Foundation Act of 1950, as amended (42 U.S.C. 1861-1875); maintenance and operation of aircraft and purchase of flight services for research and operations support; maintenance and operation of research ships and charter or lease of ships for research and operations support; hire of passenger motor vehicles; not to exceed \$1,000 for official reception and representation expenses; \$102,100,000 to remain available until expended: *Provided*, That receipts for support services and materials provided to individuals for non-Federal activities may be credited to this appropriation: *Provided further*, That no funds in this account shall be used for the purchase of aircraft.

\$115,080,000

(Department of Housing and Urban Development -
Independent Agencies Appropriation Act, 1984.)

AND ENGINEERING

SCIENCE EDUCATION ACTIVITIES

and engineering

For necessary expenses in carrying out science education programs and activities pursuant to the purposes of the National Science Foundation Act of 1950, as amended (42 U.S.C. 1861-1876), including award of graduate fellowships, services as authorized by 5 U.S.C. 3109, and rental of conference rooms in the District of Columbia, \$75,000,000 to remain available until September 30, 1985. *Provided*, That to the extent that the amount of this appropriation is less than the total amount authorized to be appropriated for included program activities, all amounts, including floors and ceilings, specified in the authorizing Act for those program activities or their subactivities shall be reduced proportionally: *Provided further*, That no less than \$34,000,000 shall be made available for merit based instructional materials development, evaluation and demonstration activities: *Provided further*, That up to \$5,000,000 may be transferred from funds provided under this head to and merged with funds made available under "Research and related activities" for the purpose of conducting research on teaching and learning.]

\$75,700,000

1986

(Department of Housing and Urban Development -
Independent Agencies Appropriation Act, 1984.)

SCIENTIFIC ACTIVITIES OVERSEAS (SPECIAL FOREIGN CURRENCY PROGRAM)

For payments in foreign currencies which the Treasury Department determines to be excess to the normal requirements of the United States for scientific activities, as authorized by law, \$2,900,000 to remain available until September 30, 1985. *Provided*, That this appropriation shall be available in addition to other appropriations to the National Science Foundation, for payments in the foregoing currencies.

\$2,800,000

1986

(Department of Housing and Urban Development -
Independent Agencies Appropriation Act, 1984.)

XIII. MINORITY VIEWS

The House Committee on Science and Technology has had a long standing tradition of supporting the leadership role of the National Science Foundation (NSF) in nurturing scientific eminence in the United States. The Foundation has the unique capability of promoting excellence and innovation in all fields of science and engineering through its support of basic and applied research. Its position in affecting science and engineering education remains unmatched by any other federal, state or private entity. We fully support NSF and advocate the funding necessary to enhance these vital functions of the National Science Foundation.

The fiscal year 1985 budget request exemplifies the broad range of scientific research initiatives necessary to carry the United States into the next century, including such proposed enhancements as the Very Long Baseline Array, the Advanced Scientific Computing Centers and Networks, the Centers for Cross Disciplinary Research in Engineering, and the Postdoctoral Fellowship Program in Plant Biology. In promoting these initiatives, the Foundation maintains its strong support of the more traditional fields of science.

As we consider this authorization, the federal government is faced with a deficit level approaching \$200 billion for fiscal year 1985. In view of the deficit problem, we believe it is especially admirable that this Administration has acknowledged the significant contribution scientific and engineering research and education are making to our national strength. Specifically, the Foundation has experienced two consecutive years of healthy budget increases. The 1984 request was an 18 percent increase over fiscal year 1983; likewise, the fiscal year 1985 request is 13.6 percent above the previous year. The Republican members sought to protect the level and distribution of these increases at both the subcommittee and full committee markups. We believe it extremely unfortunate that the Administration's sound proposal was not preserved by the committee. The increases by the Majority are unacceptable to us. Such adjustments, we believe, will have an adverse affect on the scientific excellence of research funded by the Foundation since it will drain monies from needed research and apply it for initiatives too immature to properly absorb such increases. Finally, such committee action flies in the face of our view of the responsibility of members of this House to control federal spending in order to preserve the economic recovery.

For these reasons, we cannot support the NSF authorization bill for fiscal year 1985 with the excess of \$58.5 million above the request, as reported by the committee.

LARRY WINN, Jr.,
F. JAMES SENSENBRENNER, Jr.,
JUDD GREGG,
BILL LOWERY,
AL McCANDLESS,
RAYMOND J. McGRATH,
HERBERT H. BATEMAN,
ROD CHANDLER,
ROBERT S. WALKER,
TOM LEWIS,
WILLIAM CARNEY,
CLAUDINE SCHNEIDER.

XIV. ADDITIONAL VIEWS OF REPRESENTATIVE SHERWOOD BOEHLERT

The United States is preeminent in computer technology. It is essential and clearly in the national interest—for all the right reasons—that we maintain that position. So much is at stake in terms of our economy, jobs, balance of payments and the like.

We are being challenged, and severely so, from abroad. The Japanese are foremost on the list of those who would displace the U.S. in our number one position.

What is happening now is analogous to what took place in the world automobile industry a decade ago. Then, too, the United States was preeminent. Then, too, much was at stake. And, then, too, we were severely and, unfortunately, successfully challenged from abroad. We all know what resulted. Japan accomplished what it set out to do and its auto industry soon prevailed in world markets, including our domestic market. Our auto industry went into a nosedive, our balance of payments one-time surplus became a serious deficit and tens of thousands of American auto workers suddenly were without a job.

If someone ten years ago sounded the alarm for the auto industry and advanced a plan to prevent what ultimately occurred, Congress and the American people would have grabbed the plan and ran with it.

Fortunately, patience, persistent and hard work have paid off for our auto industry which has regained its' earned position on the top. But there has been a lot of pain in the interim.

We wish to avoid similar pain for the U.S. and her people with respect to computer technology. To do so will require a commitment and the resources to back it up.

Our subcommittee on Science, Research and Technology seized the opportunity to be constructive in advancing a modest program necessary to do some of those things that need to be done to help guarantee we maintain preeminence as a nation in computer technology. We added \$80 million to the Administration's \$20 million budget request for Advanced Scientific Computing, spreading the funds throughout the research directorates in the National Science Foundation's fiscal year 1985 budget.

We wanted to provide the resources needed to, among other things, set up a networking system linking our university research centers with the latest in computer technology, something now sadly lacking.

It is not necessary to relate all the positive spinoffs from such an action. All acknowledge they are considerable. And it is not necessary to go into the details of what should be done and how with respect to moving forward in the area of Advanced Scientific Computing. Whetted appetites will be amply nourished by a reading of the NSF Bardon Report.

Regretfully, the full Committee was not as generous with funding as the SRT Subcommittee, cutting back the overall authorization by \$40 million so the final bill has \$60 million rather than \$100 million for Advanced Scientific Computing. Admittedly, a three fold increase in the budget request is nothing to sneeze at and no one identified with the effort need be apologetic in view of the overall budget demands, our collective desire to minimize the deficit and our determination to get at the national debt.

The fact remains, however, that as priorities for spending are determined, as they should be, a high place on the list should be accorded programs which ultimately are in support of our commitment to maintaining and strengthening the United States' preeminent position in computer technology.

This is not a one shot deal by any stretch of the imagination. All of us must be prepared to provide even more for the program next year and in years to come. It's clearly worth it.

